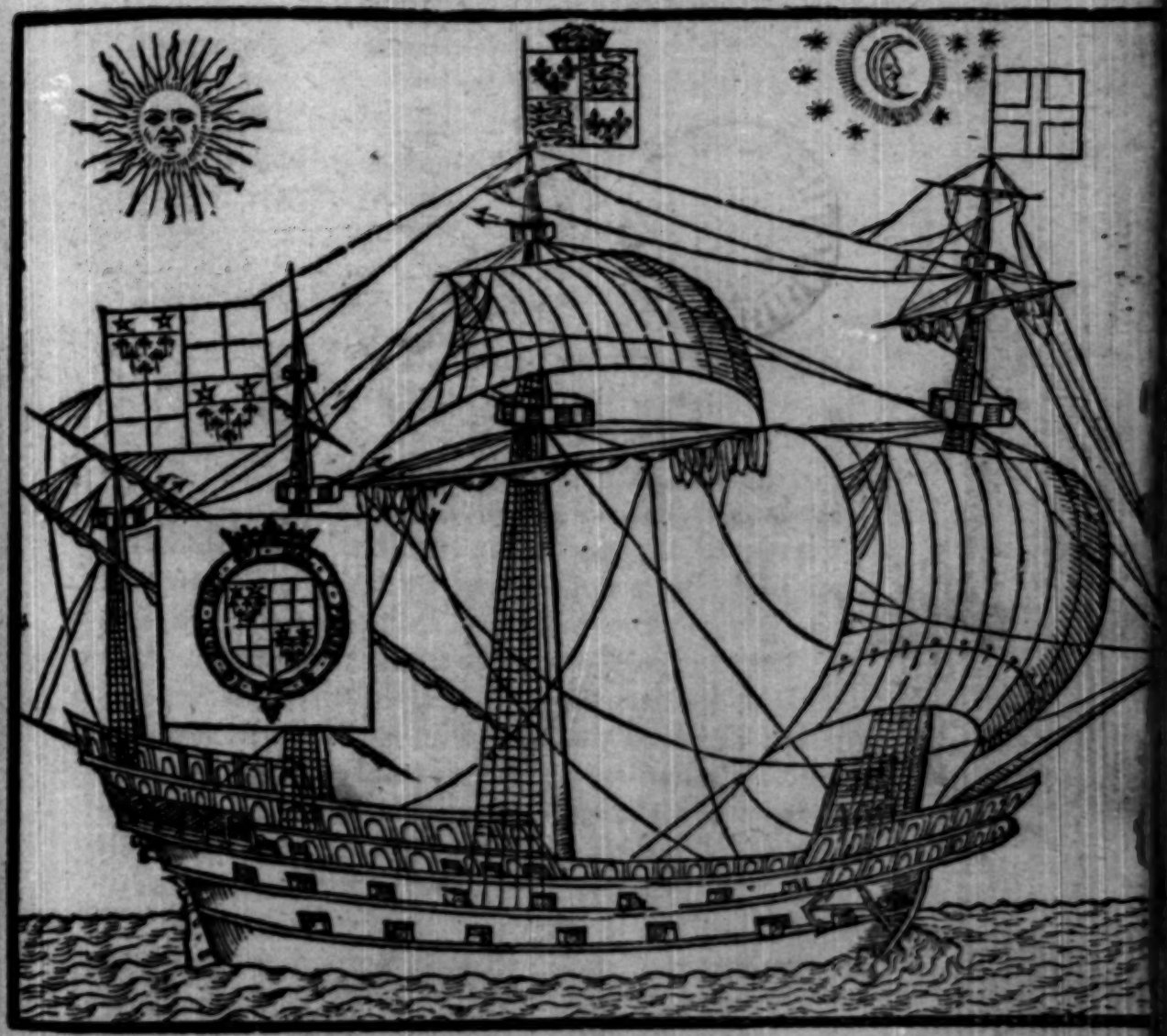
¶A REGIMENT FOR THE SEA, CONTEINING VERY NECESSARY MATters, for all sorts of Sea-men and Trauailers, as Masters of ships, Pilots, Mariners & Marchaunts,

NEWLY CORRECTED AND AMENded by the Author.

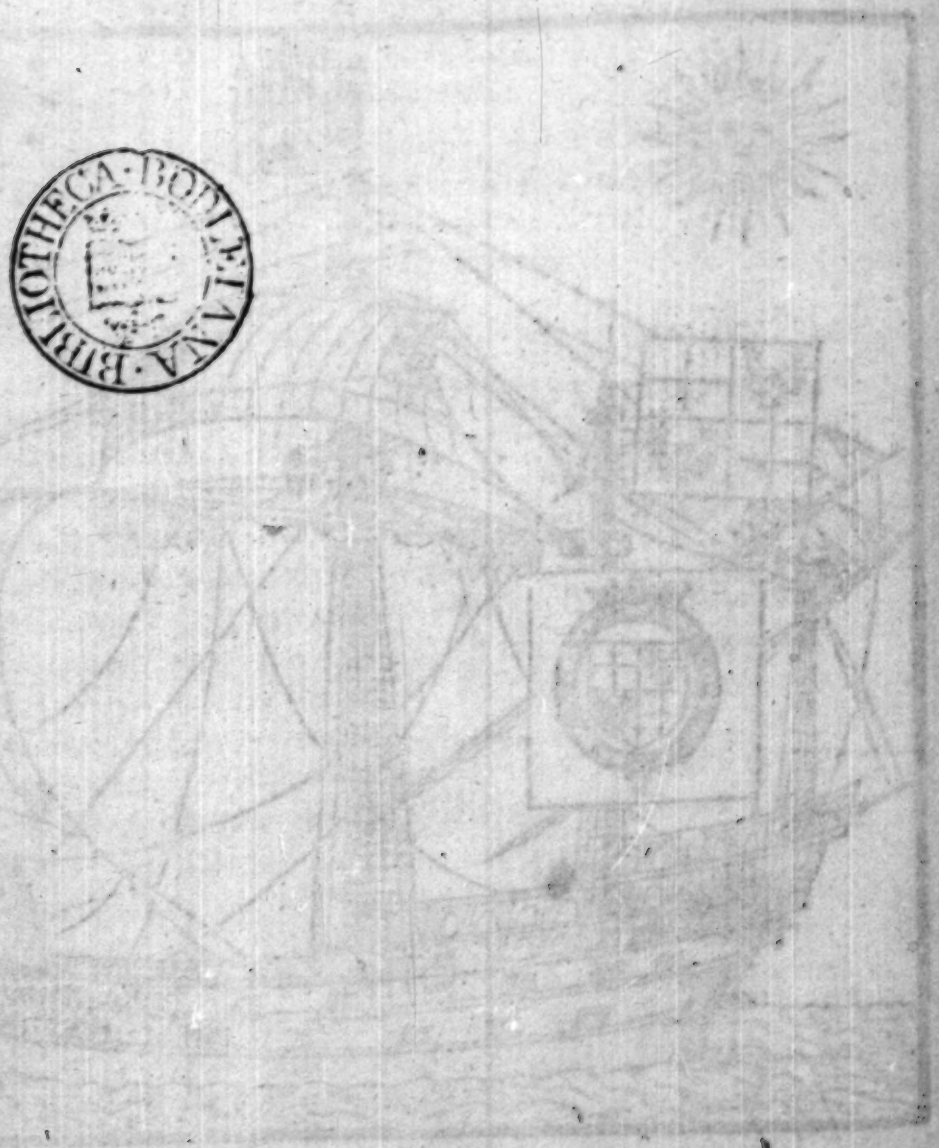
Where-vnto is added a Hidrographicall discourse to goe vnto Cattay, fiue seuerall wayes.

Written by *VVilliam Bourne.*



IMPRINTED AT LONDON BY *T. EAST.* for Iohn Wight.

BIBLIOTHECA · BONELLIANA



¶TO THE RIGHT HO-nourable, Edward Earle of Lincolne, *Baron of Clinton and Say*,

Knight of the Noble order of the Garter, Lord high Admirall of England, Ireland, and Wales, and of the Do-*minions and Iles thereoff, of the Towne of Calice and Marches* of the ſame, Normandie, Gaſcoyne, and Guyone,

and Captaine generall of the Queenes Maieſties Seas and Nauie Royall,

VVilliam Bourne wiſheth increaſe of Honour, in perfect health.

RIGHT Honourable, and my ſingular good Lord and Maſter, when I had often repeated and called to my remembraunce the opinion and ſayings of the ſage and auncient Writers, that one man ſhould be an Inſtructer to an other, by ſeeking & paines taking to doe them good: ſo at ſundry times haue I ſtudied & deuiſed with my ſelfe, what thing to take in hand that might moſt profit my friends and my natiue Countrey: and at the length it came vnto my remembraunce how neceſſary a thing it was for Sea-faring men to haue ſome good inſtructions: whervpon I haue written this baſe and ſimple Regiment for the Sea, and Rules of Nauigation, for that I knowe it to be ſo needefull & neceſſary for all ſorts of Sea-men. Therefore at ſundry times as I haue had leaſure, I haue compiled and written this baſe & ſimple worke, calling

Jeffrey Gilbard owe this Booke

to remembraunce the ſaying of *Plinie*, who thought all time loſt, which he did not beſtow at his booke: I being of all other moſt ſimple, yet notwithſtanding this enterpriſe, haue I taken in hand, to publiſh this ſimple booke vnto all men.

And for that all my labours be due vnto your Honourable Lordſhip, according to my bounden duetie I preferre it vnto your Honour, hoping that your Lordſhip will vouchſafe to take it in good part, & to receiue this barbarous worke, more to take it as my good will, (which is to offer things of much more excellencie) thā the fineneſſe of the worke, for that it is but ſimple. And ſo ſhall I not onely be ſatisfied, but alſo further encouraged heereafter to trauel according to the ſimple gift & talent that God hath giuen vnto me: For that it is not altogether gathered out of other bookes, but that the greateſt part is deuiſed & practiſed by me. Therefore I truſt my labours (ſuch as they be) ſhall not hinder the cunning and learned ſorte, but further the late beginners, that are as yet not well inſtructed. And thus I ceaſe to trouble your honourable Lordſhip any longer, deſiring you to take this ſimple thing in good part, as a true token and ſigne of my good will, beſeeching God of his grace to proſper your Lordſhip in honor & vertue with perfect health. Amen.

By your Honors poore ſeruaunt, *William Bourne.*

The Preface to the Reader.

IN my opinion (gentle Reader) which alſo is the ſaying and writing of al the Philoſophers, thoſe thinges are moſt principally to be taught and mainteyned, which in the common wealth are moſt profitable & neceſſary. Then may I boldly ſay (without iuſt cauſe of reproofe) & affirme, that Nauigation is not the leaſt, but one of the principall matters to be knowen, as this time doth require. Conſidering the ſtate and ſcituacion of our Countrey, for that we be inuironed round about with the Sea, ſo that we neither can go out of our countrey, neither they that are of other countryes can come at vs but only by Sea. Theſe things (I ſay) conſidered, what can ther be more neceſſary to be taught in our common weale, than Nauigation, conſidering alſo what Nauigation is: as Nauigation is how to direct their courſe vpō or thorow the ſea, where he findeth no path to any place aſsigned, and how to attayne the port or place appointed in ſhorteſt time, how alſo to preſerue the ſhip & goods in al common diſturbances, as ſtormes, daungers by the way, and ſuch other lyke, &c. More-ouer and beſides that, it is not vnknowen how neceſſary Nauigation is, both for the tranſportation of our commodities, to finde vent for them in other countryes (whereby no ſmall number of people is ſet a worke in England) & alſo the bringing of other commodities (that we haue neede of) vnto vs, by which meanes the Queenes Maieſtie receiueth no ſmall benefite for this hir cuſtomes, &c. And furthermore, for that Nauigation is the chiefe force and ſtrength of our countrey, which whether it be true, I referre to the Iudgement of all men, and although I bee but ſimple (gentle Reader) and a great number of excellent learned men in the Mathematicall Science, haue

written diuers bookes of Cosmographie and Nauigation, yet notwithstanding I haue written this Regimēt for the Sea, with a few Rules of Nauigation, as it were a Nosegay, whose Floures are of mine owne gathering. And albeit the learned sort of Seafaring men haue no neede of this booke, yet am I assured that it is a necessary booke for the simplest sort of Seafaring men: For that they shall finde heere the names of the Circles in the Sphere, with the names of diuers things meete for Nauigation, together with their vses, which the moste part of Sea men doe mistake or missecall, neither doe they know the vse of thē, being yet most necessary for thē that vse Nauigation. In which also there is a Table of Declinatiō calculated for foure yeares (that is to say, for the yeare of our Lord. 1577. the first after Bissextilis, the yeare. 1578. being the second yeare, & the yeare 1579. which is the third yere, with the yere. 1580. which is the yeare of Bissextilis, or Leape yeare it selfe) which the Sea-men doe call a Regiment, & will serue for. 24. yere without any great error, & is exactly calculated for the lōgitude of London, for the instāt time of noone, & wil serue al Europe & Africa, nere vnto the coast of America without much error, sauing in Februarie, March or Septēber, whilest the Sun hath swift declination. But in Iune and December it will serue all the world ouer: bicause the Sunne hath but slow declination, &c. And also there be other necessary Rules of Nauigation, to know how to handle the Suns declination, to know the altitude of either of the two Poles, (as the Contents of the booke doe shew) with other necessary things meete to be knowen in Nauigation, and not mentioned in the booke of Martin Curtise, called the Art of Nauigation. Neither doe I meane to write any thing mentioned in that booke, for that it is there sufficiently declared already. And thus (gentle Readers) I desire you to beare

with

with my rudenes, that I ſhould take vpon me to open any ſcience, for that I am vtterly vnlearned, and without helpe of anye learned perſons, deſiringe you not to conceiue any euill opinion of mee, but to take it as my good will, minding to profite my natiue Country, as much as lyeth in me. Notwithſtanding it is poſsible that ſome people wil be offended with me, that I ſhould write this ſimple Treatiſe, but then I conſider againe & know, that Vertue lacketh no enemies and defacers, & Vice lacketh no friends and maintainers, ſo that knowledge lacketh no contempt, neyther ignoraunce lacketh furtheraunce, and eſpecially among all people there is none more ready to contemne then the ignorant ſort: for ignorance is the father of all errors, and the mother of contention.

And thus I draw to ende, deſiring you to take this ſimple worke in good part, beeing willing to pleaſure my natiue Country, according to the ſimple talent that God hath giuen me. And where-as you finde any errour, I pray you let me gently vnderſtand, for I thinke not that I can ſo circũſpectly worke, but I may be deceiued, for man cannot be ſo preciſe but he may erre, and I haue ſeldome hearde of anye the beſt Authours but hee hath erred in ſome poynt: Therefore in thoſe things that he knoweth not of himſelfe, he muſt needes follow his Author, and if his Author doe erre, he muſt needes fall into the ſame errour that his Author doth. And furthermore a number of people there be that deuiſe nothing elſe but lyes and ſlaunders, yea, and thoſe which cannot atteine to any thing themſelues, doe hate all thoſe that be not ignoraunt as they themſelues be: For the corrupt nature of man is ſuch, that it is a corſey to their hartes that any ſhould be commended before themſelues, for generally amongſt al people of the earth (which is innumerable.) euerye ſeuerall perſon

thinketh

thinketh himselfe most worthy, imagining themselues to haue no fellowes: such is the Diuell in the harte of man, pampering mans hart so with pride to thinke he hath no fellow, where-as man of himselfe is not able to do any good thing, no, not to thinke one good thought, but by the onely mighte and prouidence of almightie God, therefore of our selues we can do nothing that is good. And thus gentle Reader I make an ende. If this simple and barbarous thing be taken in good part, then looke for other of my workes shortly, and beare him good will that studieth for the benefite of his natiue countrey, desiring God of his grace, that I and you may doe that thing that may be to the laude, praise, & glory of God, to our commoditie, and soules health, to the profite of our bretheren, & the common wealth of this our Realme. Thus I betake you to almightie God the Creator of all things, praying him that both I and you may after this life rest in the kingdome of Heauen with Abraham, Isaac, and Iacob: ther to remain world without ende. Amen.

To the Reader.

Gentle Reader, I haue thought it good now in this third Impression to mend or correct certeine faultes that were in the first, but most specially in the second Impression: For that it was printed the second time, I not knowing therof, so that it had not onely those faults that wer printed out of the first written Coppy, but a great number of new faultes more then that it had in the first. Wherefore I haue not only mended and corrected those faults but in lyke manner I haue added other necessary matters, not before this time printed, as this. What Ercentrik is, and also what Paraler is, and his vse, as it doth appeare in the .6. folio of the booke. And also I haue in lyke manner shewed how that Sea-men shall know when that the Mone is in hir slow & swift motion, which is known by ỹ Prime, as it is declared in the thirde Chapter. And also how for to knowe the Mones latitude as it is shewed in the .4. Chapter. And also I doe shew in the .5. chapter, the cause that there is more dayes from the Equinoctiall of March vnto the Equinoctiall of September, then there is from ỹ Equinoctiall of September vnto the Equinoctial of March. And also I haue added vnto ỹ .x. Chapter certeine matters as touching discoueries vnto the North parts. And furthermore, I haue shewed in the .14. chapter how for to know how fast or softly that any ship doth goe, and how for to keepe a perfect account of the ships way. And also I haue altered cleane the .17. Chapter, and shewed how that the Sea-men shal know what part or quantitie that they haue passed or gone of the whole earth, whereby that they shall know the diuersitie of aspects as the Eclipses of the Mone, and the alteracion of [illegible] and also I haue added diuers things in sur[illegible]

of the booke, that I doe omit for breuitie. And in lyke manner I haue added vnto the ende of the booke, a Hidrographicall discourse for to goe vnto Cattay. 5. seueral or sundry wayes that is to say, the first way is about by Cape bone sperance, which is that wayes that the Portugalls doth go vnto Calicut and vnto the Moluccas and other places in the East Indies, the second way is thorow the straights of Magalenos, into the South sea the third way is towardes the Northwest, where-as Captaine Forbisher and Christopher Hall, hath begon the discouerie now called Meta Incognita, and the .4. way is by the Northeast by the coast of Noua Zembla, that Master Stephen of Borrose, hath begon that discouerie. And the .5. way is by the North Pole if that it be nauigable, &c.

Now it is possible that I maye be enuied of diuers & sundry people for that I haue written this discourse of the passages vnto Cattay, for that the nature of a number of men is to dislyke of all things not done by themselues: But notwithstanding al is one vnto me whether they doe lyke or dislyke. For that I doe know some persons hath already made euill report of that I haue written before this time, yet notwithstandinge I will not stay my pen for their malice for althongh their skilles is much more then mine, my meaning is not to teach any of them but to instruct the simplest sort of Sea-men, for to shew vnto them such thinges as is necessary for them for to know. And also some sort of people are of that nature, if that they write or talke of any things past their capacitie, then they will saye that he can talke well, but they themselues cannot talke but they can doe, but this is the truth, whatsoeuer he be that will say that he can doe any thing, and if that he cannot shew the Reason of the doing thereoff I doe

say

say vnto you he cannot doe it and this is most certeine for if that he doth it, he doth it but by Fortune: Euen as he that drewe his Bow by chaunce in the Asirians hoaste, and slewe Achab the king of Israell, as wee doe reade in the third booke of the Kings and the last Chapter, when that Iosaphat the king of Iuda, and Achab king of Israel, went to Battaile agaynst Ramoth in Gilead.

For this is generall amongest Sea-men and also Gunners how simple or without skill soeuer that they be, if that they haue once taken charge to be the Master of a shippe he thinketh great scorne to learne at any mans hande, but will bragge of himselfe how long he hath bene a Master, and GOD knoweth vtterlye without skil, but that he is a Coaster, and doth knowe the markes for to carrie a shippe ouer the lands ende, and ouer the Naase.

But good simple men, if that they coulde not doe that, then there were nothinge in them: For euerye man must needes bee skilfull and know that place that a number of times he hath occupied & hath bene taught vnto him.

And who doubteth but a simple Fisher-man of Barking knoweth Barking Creeke, better then the best Nauigator or Master in this lande: so who doubteth but these simple men doth know their owne places at home. But if they should come out of the Occean sea to seeke our chanel to come vnto ỹ riuer of Thames, I am of that opinion, that a number of them, doth but grope as a blinde man doth, & if that they doe hit wel, that it is but by chaunce, and not by any cunning that is in him.

But I doe hope that in these dayes, that the knowledge of the Masters of shippes is very well mended,

for I haue knowen within this .20. yeares that them that were auncient maſters of ſhips hath derided and mocked thē that haue occupied their Cards and Plats, and alſo the obſeruatiō of the altitude of the Pole, ſaying that they care not for their Sheepes ſkins, for hē could kēpe a better account vpon a bord.

And when that they did take the latitude, they would cal them ſtarre ſhoters and Sunne ſhoters, and would aſke if they had ſtriken it. Wherefore now iudge of their ſkilles, conſidering that theſe two poyntes is the principal matters in Nauigation. And yet theſe ſimple people will make no ſmal brags of themſelues, ſaying: that he hath ben Maſter this .20. yeares, and neuer had no miſfortune, and alſo if that they could heare of any that did vſe Plats and Inſtruments that had any miſfortune, then they woulde not a little bragge of themſelues what notable fellowes they themſelues were.

O what a notable folly was in theſe men not conſidering what they thēſelues were. For this is moſt certeine, that it is not wiſedome nor cunning that canne preuent nor alter Gods prouidence, if that it pleaſeth him to lay his ſcourge vpō vs. For if that men through cunning could prouide that no miſfortune ſhould happen vnto them, then were they Gods and not men, and yet notwithſtanding we muſt not condemn cunning & knowledge but put all things vpon Fortune, then you may take one from the Plough and make him Maſter of a ſhip, and ſay he hath good Fortune. And thus (gentle Reader) I ceaſe, requeſting thee to accept this as a ſimple preſent proceēding of good will.

Thine W. B.

For

For that the common people do fall into such a number of errors as touching the length of the day, holding an opinion, that in euery fifténe dayes, the day is an houre longer or shorter, ẏ truth is this: the day doth keepe no such proportion in the lengthning & shortning but doth length and short according vnto the swiftnesse and slowenesse of the Sunnes declination: for when the Sunne hath swift declination, then doth the daye lengthen and shorten apace: and when that the declination is slow, then doth the day lengthen or shorten but slowly. And yet the most part of the cõmon people do holde an opinion, that at Christmasse or else at New yeares day at the furthest, the day must nedes be an houre longer, and yet the Sunne hath not declined or come towards the Equinoctial two degrées and a halfe, which will not make halfe an houre in the length of the daye wherfore I do thinke it good to declare thorow ẏ whole yere, when ẏ day is an houre longer or shorter hére in this place, for the latitude or height of the Pole Artick at London, ẏ Pole being rayſed fiftie one degrées, thirtie two minutes, or thirtie foure minutes: and our longest Summer day is sixténe houres, and a halfe, & our shortest winter day is seauen houres and a halfe, from the rising of the Sunne vnto the setting of the Sunne: & first this, the shortest Winter day, is the. 11. or. 12. day of December, and then the Sunne riseth a quarter of an houre after eight, and setteth a quarter of an houre before foure of the clocke, & then the Sun hath his greatest declination vnto the Southwards. And then the 29. day of December the day is a quarter of an houre longer, then riseth the Sunne at eight of the clocke and sets at foure. And then the. 17. or. 18. of January the day is an houre longer and not before, for the Sunne must be declined from his Solstick of Winter, fiue degrées and twelue minutes, before the daye is lengthe-

ned an houre, so that I doe affirme, that from the .4. or .5. day of November, vnto the .17. or .18. day of January, in all that time the day is but one houre shorter & longer, which is the time of ten wækes. And then the 27. or 28. of January the night is fiftæne houres long, then riseth the Sunne halfe an houre after seuen, and setteth halfe an houre after foure of the clock. And then the leuenth or twelfth day of February the day is ten houres long, then riseth the Sunne at seuen, and setteth at fiue of the clocke. And then the fire and twentie day of February ẏ day is a leuen houres long, then riseth the Sun halfe an houre after fire, & setteth halfe an houre after .5. of the clocke. And then the leuenth day of March then ẏ Sun is vpon the Equinoctial, & the day iust .12. houres long al ẏ world ouer. And then ẏ .24. day of March, the day is thirtæne houres long, & then riseth the Sunne halfe an houre before fire, and setteth halfe an houre after fire of the clocke. And then the seuenth day of Aprill the day is fourtæne houres long, & then riseth the Sunne at fiue of the clocke iust, and setteth at seuen of the clocke iust. And then the .23. day of Aprill the day is fiftæne houres long, and ther riseth the Sunne halfe an houre before fiue, and setteth halfe an houre after seuen of ẏ clock. And then ẏ .15. day of May the day is sirtæne houres long, then riseth the Sunne at foure of the & clocke setteth at .8. of ẏ clock iust. And then the leuenth of June the Sunne hath his greatest declination to the Northward, and then is our longest Summer dayes, and then it is sirtæne houres and a halfe, from the Sunne rising vnto the Sunne setting so that the sunne riseth a quarter of an houre before .4. and setteth a quarter of an houre after .8. of the clocke. And then the .x. day of July the day is sirtæne houres longe, then riseth the Sunne at foure, and setteth at

eight

eight of the clocke. And then the laſt daye of July, the daye is fifténe houres longe. And then the ſirténe day of Auguſt the daye is fourténe houres long. And then the laſt day of Auguſt the day is thirtén houres long. And then the thirténe or fourténe of September the Sunne is vpon the Equinoctiall and the daye iuſt twelue houres long. And then the.27. day of September the day is eleuen houres long. And then the.11. day of October the day is ten houres long. And then the 26. day of October the day is nyne houres long. And then the fifténe day of Nouember the day is.8. houres long, and ſo vnto the eleuenth or twelfth day of Decẽber, and then the daye is at the ſhorteſt (as before is declared.)

Thus much haue I ſayd as touching the length of the day by euen houres, which ſome people wil haue at the entrance of the Sun into ỹ twelue ſignes, of which in the lengthning and ſhortning of the day there is no ſuch matter, but onely this: Loke when that the ſun hath declined fiue degrees and twelue minutes in this our latitude, then is the day an houre longer or ſhorter, as you ſhal finde this matter more largelier ſpoken off in all places through the world, in the leuenth chapter of the Booke.

Faults eſcaped in the Printing.

Fol.6.b.lin.29.for turants, read Curtants. Fol.9. b.lin.18.for .1. reade 12. Fol.14.a.lin.20. for wondes, read wands. Fol.14.b.lin.2.for Naale, read Nas. Fol. 33.a.lin.21.hath, read and hath. Fol.40.a.lin.27.for.2. leag. read.200.leag. Fol.41.a.lin.27.is, reade as it is Fo. 41.b.lin.9.for.24.read.14. Fol.41.b.lin.20.for.30. read.20. Fol.46.a.lin.10. for ſtaunce, read diſtaunce. Fol.46.a.lin.15.for Barrowes, read Borroſe.

¶ A Table

¶ A Table of the reigne of Kings since the Conquest.

Number of Kings and Queenes.	The names of the kings of England.	Beginning of their Reigne.	Time of their death.	The place of their burrall.
1	Willia Conqueror	14. Oct.	9. Sept. 1087.	Cane in Nor.
2	William Rufus.	9. Sept.	1. Augu. 1100.	Westminster
3	Henry the first.	1. Aug.	2. Dece. 1136.	Reding.
4	Stephan.	2. Dece.	25. Octo. 1154	Feuersham.
5	Henry the seconde.	25. Oct.	6. July. 1189	Fonteuerard
6	Richard the first.	6. July.	6. Aprll. 1199.	Fonteuerard
7	John.	6. Aprll	19. Octo. 1216.	Worcester.
8	Henry the third.	19. Oct.	16. Nou. 1272.	Westminster
9	Edward the first.	16. No.	6. July. 1307.	Westminster
10	Edward the second	6. July.	25. Jan. 1327.	Glocester.
11	Edward the thirde.	25. Jan.	21. June. 1377	Westminster
12	Richard the second	21 June	16. Sep. 1400	Westminster
13	Henry the fourth.	16. Sep.	20. Mar. 1413.	Canterbury.
14	Henry the fifth.	20. Ma.	31. Aug. 1422.	Westminster
15	Henry the firt.	31. Aug.	4. Mar. 1461.	Windsore.
16	Edward the fourth	4. Mar.	9. Aprill. 1483	Windsore.
17	Edward the fifth.	9. Aprll	22. Jun. 1484	Westminster
18	Richard the third.	22. Jun.	22. Aug. 1486.	Leycester.
19	Henry the seuenth.	22. Aug	22. Apri. 1509.	Westminster
20	Henry the eight.	22. Apr.	28. Jan. 1547	Windsore.
21	Edward the firt.	28. Jan.	6. July. 1553.	Westminster
22	Quæne Mary.	6. July.	17. Nou. 1559.	Westminster
23	Quæne Elizabeth.	17. No.		

The Kalender.

Ianuary hath.xxxj.dayes.

3	1	a	New yeares day.
	2	b	Octa. Stepha.
11	3	c	Octa. John.
	4	d	Octa. Inno.
19	5	e	Theloſopho. hi.
8	6	f	Twelfth day.
	7	g	Julian Mart.
16	8	a	Seuerine Biſh.
5	9	b	Martian Virg.
	10	c	Paule firſt her.
13	11	d	Sunne in Aquari
2	12	e	Satire Mar.
	13	f	Oct. Epiphani.
10	14	g	Iſidore Mart.
	15	a	Maurice.
18	16	b	Anthonie Abbot.
7	17	c	Marcelle Biſh.
	18	d	Priſce Biſh.
15	19	e	Mari. and his fel.
4	20	f	Fabian and Sa.
	21	g	Agnus Virg.
12	22	a	Vincent Mar.
1	23	b	Emerice.
	24	c	Timothie diſcip.
9	25	d	Con. of Paul.
	26	e	Policarp. Mart.
17	27	f	Chryſoſt. Doct.
6	28	g	Theodore.
	29	a	Valerie Biſh.
14	30	b	Tran. S. Marke.
3	31	c	Ciri. and Jan.

February hath.xxviij.dayes and in the yere of Biſſextilis.xxix.dayes.

	1	d	Brigit. Faſt.
11	2	e	Puri. of Mary.
19	3	f	Blaſe Mart.
8	4	g	Gilbert Confeſ.
	5	a	Agathe Virgin.
16	6	b	Dorothie. virgin.
5	7	c	Amandus Biſh.
	8	d	Salamon.
13	9	e	Sunne in Piſc
2	10	f	Sother Biſhop.
	11	g	
10	12	a	Eufraſe Virgin.
	13	b	Valentine Biſh.
18	14	c	Fauſtine Biſh.
7	15	d	Julian Virg.
	16	e	Conſtance Virg.
15	17	f	Simeon Martir.
4	18	g	Gabine Priеſt.
	19	a	
12	20	b	60. Martirs.
1	21	c	70. Martirs.
	22	d	Peters Chayre.
9	23	e	Sirener. Faſt.
	24	f	Mathie Apoſt.
17	25	g	Policar. Biſhop.
6	26	a	Victor & his fel.
	27	b	Auguſtine. Biſh.
14	28	c	Oſwald Biſhop.

March hath.xxxj.dayes.				Aprill hath.xxx.dayes.			
3	1	d	Dauid Bishop.		1	g	Theodore Virg.
	2	e	Basilic.mart.	11	2	a	Mary Egypti.
11	3	f	Marime mart.	19	3	b	Richard Bishop.
	4	g	Lucius mart.	8	4	c	Ambrose bishop.
19	5	a	Focius mart.		5	d	Marci,and Ma.
8	6	b	Vict.and Uenin.	16	6	e	Sertus mart.
	7	c	Tho.de Aquin.	5	7	f	Euphemi Virg.
16	8	d	Apoline mart.		8	g	Denise mart.
5	9	e	40.Martirs.	13	9	a	Perpetuus bish.
	10	f	Gregorie bishop.	2	10	b	Marcus mart.
13	11	g	Sunne in Aries.		11	c	Sunne in Taurus
2	12	a	Zacharie bishop.	10	12	d	Appoline mart.
	13	b	Longine mart.		13	e	Sother mart.
10	14	c	Patricius bish.	18	14	f	Tiburt martir.
	15	d	Gertrude Virg.	7	15	g	Osmond bishop.
18	16	e	Anselme.		16	a	Isidore Bishop.
7	17	f	Edward king.	15	17	b	Anicete Bishop.
	18	g	Joseph spons.	4	18	c	Eluther bishop.
15	19	a	Cutbert bishop.		19	d	Tiburtius Con.
4	20	b	Benedict Ab.	12	20	e	Hermogenes.
	21	c	Affrodose bishop	1	21	f	Quintine.
12	22	d	Pigment. bishop		22	g	Clete bishop.
1	23	e	Theodore.	9	23	a	Gorge mart.
	24	f	Fast		24	b	Wilfride Conf.
9	25	g	Annun. of Mary	17	25	c	Marke Euan.
	26	a	Castore mart.	6	26	d	Anastace bishop.
17	27	b	John Heremy.		27	e	Vitalis mart.
6	28	c	Dorothe mart.	14	28	f	Peter of mi.
	29	d	Eustace.	3	29	g	Clete bishop.
14	30	e	Sabine Virg.		30	a	Dep.of Erken.
3	31	f	Balbine Virg.				

May hath.xxxj.dayes.

11	1	b	Philip & Iacob.
	2	c	Athanasius bish.
19	3	d	Inu.of the crosse
8	4	e	Christopher.
	5	f	S.Augustine.
16	6	g	John Port lat.
5	7	a	John of Beuer.
	8	b	Appe.of Pich.
13	9	c	Transl.of Ni.
2	10	d	Gordiane.
	11	e	Sunne in Gemi.
10	12	f	Victorius mart.
	13	g	Seruacius Con.
18	14	a	Boniface mart.
7	15	b	Sophia Virgin.
	16	c	Brandon bishop
15	17	d	Transl.of Bar.
4	18	e	Dioscor. mart.
	19	f	
12	20	g	Dunstan Con.
1	21	a	Barnardine.
	22	b	Helene Quéene
9	23	c	Petronill.
	24	d	Julian Virg.
17	25	e	Desiderie mart.
6	26	f	Adelme conf.
	27	g	
14	28	a	Germaine Bish.
3	29	b	Nicodeme.
	30	c	Corone martir.
11	31	d	Felix bishop.

Iune hath.xxx.dayes.

19	1	e	Nicodeme.
	2	f	Erasmus.
8	3	g	Basill.
16	4	a	Marcel.martir.
	5	b	Petrocius Conf.
5	6	c	Boniface bishop.
	7	d	Medard and Gil
13	8	e	Transl. Edmond
2	9	f	Puan Confes.
	10	g	Tran.of Wol.
10	11	a	Barnabe Apost.
	12	b	Sunne in Taurus
18	13	c	Anthony Conf.
7	14	d	Basilides con.
	15	e	Vate modeste.
15	16	f	Transl. Richard.
4	17	g	Botulph conf.
	18	a	Eruperie bishop
12	19	b	Gerualius mar.
1	20	c	Tran.Edward.
	21	d	Walburge Vir.
9	22	e	Albane mart.
	23	f	Fast
17	24	g	Iohn Baptist.
6	25	a	Transl.of Elig.
	26	b	John and Pa.
14	27	c	Crescens mart.
3	28	d	Fast
	29	e	Peter and Paule.
11	30	f	

Iuly hath.xxxj.dayes.					Auguſt hath.xxxj.dayes.				
19	1	g	Octa.Iohn.Bap.		8	1	c	Lammas.	
8	2	a	Viſit.of Mary.		16	2	d	Steuen Biſhop.	
	3	b	Gregorie biſhop.			3	e	Finding of Ste.	
16	4	c	Domitius mart.		5	4	f	Iuſtine Prieſt.	
5	5	d	Parthene Con.			5	g	Feſtum niuis.	
	6	e	Procope Mart.		13	6	a	Tranſl. domi.	
13	7	f	Zenone Mart.		2	7	b	Feaſt of Ieſu.	
2	8	g	Paterian Biſh.			8	c	Cirack & his fel.	
	9	a	Pius Biſhop.		10	9	d	Roman Mart.	
10	10	b	Dog dayes be.			10	e	Laurence Mart.	
	11	c	Herinaco. for		18	11	f	Tiburt and Su.	
18	12	d	Anaclete biſhop.		7	12	g	Clare Virgin.	
7	13	e	Quirine & Iu.			13	a	Ypolite Virgin.	
	14	f	Sunne in Leo		15	14	b	Sunne in Virgo.	
15	15	g	Marine Virgine		4	15	c	Aſſump.of Mary	
4	16	a	Simph cum.7.			16	d	Roche Confeſſ.	
	17	b	Arlene hem.		12	17	e	Octa.Laurence.	
12	18	c	Praxede Vir.		1	18	f	Agapite Mart.	
1	19	d	Margar. Virg.			19	g	Lewes Biſhop.	
	20	e	Praxede Virg.		9	20	a	Dog dayes ende.	
9	21	f	Appoline biſhop.			21	b	Anaſtaſe Mart.	
	22	g	Mary Magda.		17	22	c	Timo and Yip.	
17	23	a	Chriſtian.		6	23	d	Eleazor. Faſt	
6	24	b	Faſt.			24	e	Barthol.Apoſtle.	
	25	c	Iames Apoſtle		14	25	f	Lewes King.	
14	26	d	Anne mo.of Ma.		3	26	g	Zepherine biſh.	
3	27	e	Panthalcon.			27	a	Rufus Mart.	
	28	f	Sampſon Biſh.		11	28	b	Auguſtine Biſh.	
11	29	g	Mary Virgin.			29	c	Johns behead.	
	30	a	Abbo and Sen.		19	30	d	Felix and Auda.	
19	31	b	German Biſhop			31	e	Cuthber. Virgin	

September hath.xxx.dayes.				October hath.xxxj. dayes.			
8	1	f	Giles Abbot.	16	1	a	Remigius bish.
16	2	g	Anthony Mart.	5	2	b	Leodegar Mar.
5	3	a	Eupheme.	13	3	c	Candide Mar.
	4	b	Moyses Pro.	2	4	d	Frances Mar.
13	5	c	Venturine.		5	e	Fayth Virgin.
2	6	d	Zacharie Prop.	10	6	f	Gerionis.
	7	e	Enurce Bishop.		7	g	Marce and Mar.
10	8	f	Natiuitie of Ma.	18	8	a	Apolinaris Mar.
	9	g	Gorgone Mart.	7	9	b	Pelagi Virgin.
18	10	a	Nicholas de To.		10	c	Linus Conf.
7	11	b	Protece and Hi.	15	11	d	Denice & his fel.
	12	c	Sire Bishop.	4	12	e	Nichasius Bish.
15	13	d	Philip Bishop.		13	f	Wilfride Bishop
4	14	e	Sunne in Libra.	12	14	g	Sunne in Scorp.
	15	f	Nicodeme priest.	1	15	a	Calixt Bishop.
12	16	g	Edith Virgin.		16	b	Wolfran bishop.
1	17	a	Lambart Bishop	9	17	c	Pich. of ỹ mount
	18	b	Victor and Cor.		18	d	Luke Euangelist.
9	19	c	Eustace.	17	19	e	Etheldred Virg.
	20	d	Fast.	6	20	f	Frideswide virg.
17	21	e	Mathew Apostl.		21	g	Austrebet virgin.
6	22	f	Maurice.	14	22	a	vi. M. virgins.
	23	g	Line Mar.	3	23	b	Mary Salome.
14	24	a	German Abbot.		24	c	Romaine Bish.
3	25	b	Cleophin & Ap.	11	25	d	Magnore bishop.
	26	c	Cipzian and Jul.		26	e	Chrisp. and Crisi.
11	27	d	Cosme and Da.	19	27	f	Fast
19	28	e	Erupere bishop.	8	28	g	Simon & Iude.
	29	f	Michael Arch.		29	a	Narcissus Bish.
8	30	g	Hierome Doct.	16	30	b	Germaine Conf.
				5	31	c	Fast

			Nouember. hath.xxx.dayes.				December hath.xxxj. dayes.
	1	d	All Saincts.		1	F	Elegi bishop.
13	2	e	All Soules.	13	2	g	Liban mart.
2	3	f	Wenefride virg.	2	3	a	Dep.of Osmond.
	4	g	Amantius.		4	b	Barbara Virg.
10	5	a	Lete priest.	10	5	c	Sabba bishop.
	6	b	Leonard.		6	d	Nicholas bishop
18	7	c	Wilborde.	18	7	e	Octa. Andrew.
7	8	d	Fower cround.	7	8	F	Con.of Mary.
	9	e	Theodore.		9	g	Cipzian bishop.
15	10	F	Marine.	15	10	a	Eulalie Virgin.
4	11	g	Martine bishop.	4	11	b	Antippe.
	12	a	Bzile bishop.		12	c	Damase Conf.
12	13	b	Sunne in Sagitt.	12	13	d	Sunne in Capric.
1	14	c	Tran.Erkenew	1	14	e	Nicasius virg.
	15	d	Macute bishop.		15	F	Othalie virgin.
9	16	e	Dep.of Edmond	9	16	g	O Sapientia.
	17	F	Init.Reg.Elizab.		17	a	Lazarus con.
17	18	g	Octa. Martine.	17	18	b	Gratian bishop.
6	19	a	Elizabeth mart.	6	19	c	Venetia virg.
	20	b	Edmond kinct.		20	d	Fast
14	21	c	Pzes.of Mary	14	21	e	Thomas Apostl.
3	22	d	Cicely Virgin.	3	22	F	rrr.Martirs.
	23	e	Clement mart.		23	g	Victor Virg.
11	24	F	Grisogon mart.	11	24	a	Fast
19	25	g	Catherine Virg.		25	b	Christmas day.
	26	a	Line mart.	19	26	c	Stephen Mart.
8	27	b	Vitales Con.	8	27	d	Iohn Euang.
	28	c	Rufus mart.		28	e	Innocents day.
16	29	d	Saturni. Fast.	16	29	F	
5	30	e	Andrew Apostl.	5	30	g	Tran.of James.
				13	31	a	Siluester mart.

A Table

A Table or Kalender for 24. yeares shewing the Prime, the Sundayes letter, and Leape yeare, and the moueable Feastes, as the first Sunday in Lent, and Easter day, Ascention day, and Whitsunday.

The yeare of our Lord	The Prime.	Dominicall letter.	First Sunday in Lent.	Easter day.	Ascension day.	Whitsunday.
1579	3	d	8. March.	19. April.	28. May.	7. June.
1580	4	cb	20. Febru.	3. April.	12. May	22. May.
1581	5	a	12. Febru.	26. Mar.	4. May.	14. May.
1582	6	g	4. March.	15. April.	24. May	3. June.
1583	7	f	17. Febru.	31. Mar.	9. May.	19. May.
1584	8	ed	8. March.	19. April.	28. May.	7. June.
1585	9	c	28. Febru.	11. April.	20. May.	30. May.
1586	10	b	20. Febru.	3. April.	12. May.	22. May.
1587	11	a	5. March.	16. April.	25. May.	4. June.
1588	12	gf	24. Febru.	7. April.	16. May.	26. May.
1589	13	e	16. Febru.	30. Mar.	8. May.	18. May.
1590	14	d	8. March.	19. April.	28. May.	7. June.
1591	15	c	21. Febru.	4. April.	13. May.	23. May.
1592	16	ba	12. Febru.	26. Mar.	4. May.	14. May.
1593	17	g	4. March.	15. April.	24. May.	3. June.
1594	18	f	17. Febru.	31. Mar.	9. May.	19. May.
1595	19	e	9. March.	20. April	29. May.	8. June.
1596	1	dc	28. Febru.	11. April.	20. May.	30. May.
1597	2	b	13. Febru.	27. Mar.	4. May.	15. May.
1598	3	a	5. March.	16. April	25. May.	4. June.
1599	4	g	25. Febru.	8. April.	17. May.	27 May.
1600	5	fe	9. Februa.	23. Mar.	1. May.	11. May.
1601	6	d	1. March.	12. April.	21. May.	31. May.
1602	7	c	21. Febru.	4. April.	13. May.	23. May.
1603	8	b	13. March.	24. April	2. June.	12. June.

A profitable and necessary Rule to know the beginning and ending of euery Terme with their Returnes.

Hillarie Terme beginneth the.xxiij.of Ianuary,if it be not Sunday,which then is referred vntill the nert day after,and endeth the.xij.of Febzuary,& hath foure Returnes,that is to say:

Octauis Hilarij.	Crastino Purific.
Quind. Hilarij.	Octauis Purific.

Easter Terme beginneth.xviij. dayes after Ealter, & endeth the Monday nert after the Ascension day,& hath fiue Retutnes,that is to say:

Quind.Paschi.	Mense	Quinque Paschæ.
Tres Paschæ.	Pasch.	Crast.Ascention.

Trinitie Terme beginneth the Fridaye nerte after Trinitie Sunday,& endeth the Wednesday foztnight after, and hath foure Returnes,that is to say:

Crast.Trinitatis.	Quind.Trinitatis.
Octauis Trinita.	Tres Trinitatis.

Michaelmas Terme beginneth the. ix.day of October,if it be not Sunday,and endeth the.xxviij.oz .xxix. of Nouember,and hath eight Returnes,that is to saye:

Octauis Michael.	Crast.Animarum.
Quind. Michael.	Crast.Martini.
Tres Michaelis.	Octa.Martini.
Mense Michael.	Quind.Martini.

Note also that the Exchequer openeth eight dayes befoze any Terme begin,except Trinitie Terme,which openeth but foure dayes befoze.

Thirtie daies hath September: April,Iune,& Nouēber. February hath,xxviij,alone:& al the rest thirtie & one.

¶AN INTRODVC-
tion vnto the Regiment
for the Sea.

¶The names of certeine things necessary to be knowne of them that are Mariners or Seafaring men, meete to be knowne of them that doe practise Nauigation, as this: the names of the circles of the Sphere, and what they are, and their vses: and also the names of other things belonging therevnto, and what they are, and theyr vses.

First, vvhat the Horizon circle is.

THe Horizon is the parting of the Earth, or the Sea, & the Skye, that is to say, the halfe of the heauens being aboue ouer your head, and the other halfe hidden with ỳ Earth or Sea vnder them: & this Horizon circle doth moue as you do moue: for as you doe by trauell change your place, so doth the Horizon change in all points.

The vse of the Horizon circle.

THe vse of the Horizõ circle is this, to take the height of the Sunne or any starre, with the crosse staffe, setting the one ende with the Horison, and the other ende with the Sunne or starre, so that you haue a true Horizon: and that must be done vpon the Sea, or else it must be a very plaine ground vpon the toppe of a hill, else it is no true Horizon. And also if the Sun or Mone, or any starre be to be sene, then they be aboue the horizon: if they be not to be sene, then they be vnder the horizon.

2. What the Meridian circle is.

THe Meridian is a circle beginning due South, & so passing by your Zenith, that is right ouer ỳ crowne

of your head, and so by the two Poles of the world: & if you doe trauell due South and North, you doe not chaunge your Meridian: but in the going or trauelling any other way, you doe chaunge it.

The vse of the Meridian circle.

The vse of the Meridian circle is, to know the iust time of noone by the Sunne: for as soone as the middle of the sunne is vpon the Meridian, then it is noone, and when the Sunne, Noone or any starre is vpon the Meridian, then they be farthest from the horizon, and it is a méete tyme to take their height for to know ỳ altitude or height of the Pole of the world, whereby you may perfectly know, how farre you be to the Southwards or Northwards of any place.

3. What the Equinoctial circle is, being a Paralel lyne, or circle fixed.

The Equinoctial is a fired circle in ỳ heauẽs, equally distãt from both the Poles, & doth passe directly ouer the middle of the earth round about, & is called the Equinoctial, for that if the Sun be there, then throw all the whole world the sun is xij. houres aboue ỳ horizon, & xii. houres vnder ỳ horizon, sauing vnder ỳ two poles, & ther the Equinoctial is with the horizon. So they shal sée halfe the Sunne and no more, till the Sunne be departed from the Equinoctiall. And also to them that do inhabite or dwell in any place vnder the Equinoctiall, the Sunne, Noone, and all the Starres, be twelue houres aboue the horizon, & twelue houres vnder the horizon.

The vse of the Equinoctial circle.

The vse of the Equinoctial, is to know what declination the Sunne or any other starre hath from it, and of which side, & by that is knowne the height of the Equinoctial,

quinoctial, & by the height of that is known the height of either of the two Poles of the world.

4. What the circle or Tropick of Cancer is, being a Paralel circle fixed.

The Tropicke of Cancer, is the greatest declination that the Sunne doth come vnto the Northwards, and then is our longest Sommer dayes, & shortest nights.

5. What the circle or Tropick of Capricorne is, being a Paralel circle fixed.

The tropick of Capricorne, is the greatest declination ỳ the Sunne doth go vnto the Southwards, & then is our shortest Winter dayes, and longest nights.

The vses of these two circles be but small, but that the dayes being at the longest or shortest, the Sunne doth returne backe againe &c.

6. What the Artick circle is, being a Paralel circle.

The Artick circle doth touch the horizon due North, & is according to the place that you are in, of any place vpon the face of ỳ earth, & doth wyden & narrow according vnto the altitude or height of the Pole: for as you do go vnto the South parts, thē doth your Artick circle grow narrower & narrower, vntil you come ryght vnder the equinoctial line, & thē hane you no Artick circle: & if ỳ you doe go vnto the North parts, then doth your Artick circle grow wider & wider: & where the North Pole is raised .66. degrées & a half, ther the Artick circle is iuſt w̄ the tropick of Cancer, & then vnder the North Pole, there your Artick circle is with the Equinoctial.

The vse of the Artick circle.

The vse of the Artick circle, is to know what ſtars dō neuer ſet vnto you, for all thoſe ſtarres or lightes that you dō ſee vnder the Pole, do not ſet: & if that you be vnto the Northwards, of the height of ỳ Pole, more

than.66. degrées & a halfe: if that the Sunne or Mone be in ỳ Tropick of Cancer, they shal not go downe vnto you vnder the horizon, but shal be stil in sight vnto you, so that they be not let by the clowds & other accidents.

7. What the Antarticke circle is, being a Paralel circle.

THe Antartick circle doth touch ỳ horison due South, and is opposite or right against the Articke circle, & doth wyde and narrow in all poynts, and doth not differ from the Artick circle, sauing the Articke circle is aboue the horison, and the Antarticke circle is vnderneth the horison.

The vse of the Antarticke circle.

THe vse of the Antarticke circle, is as the Articke is, in all poynts, to know what starres wil not appeare aboue your horizon, and in lyke manner, to the Northwards of.66. degrées and a halfe, (the Sunne or Mone being in the Tropicke of Capricorne) then they will not ryse aboue the horizon.

8. What the Zodiacke is, being a circle.

THe Zodiacke is the greatest circle in all the heauẽs, wherein all the wandering lightes or Planets doe kæpe their courses, that is to say, the Sunne & Mone, & the other fiue Planets or Starres, ỳ is to say, Saturne, Iupiter, Mars, Venus, and Mercurie. &c. which circle is diuided into twelue equal parts, called the xij. signes, as Aries, Taurus, Gemini, Cancer, Leo, Virgo, Libra, Scorpio, Sagittarius, Capricornus, Aquarius, Pisces, the which circle stãdeth oblique or awry crossing the Equinoctiall in the myddle at two places: the Northermost part in the myddle of the Zodiacke, and that is the Tropicke of Cancer: and the Southermost part is the Tropicke

of

of Capricorne, the very myddle of the Zodiacke: & that lyne in the myddle of the Zodiacke is called the Eclipticke lyne, and the Zodiacke is. 12. degrées broad, that is to saye, sixe degrées from the eclipticke lyne vnto the North parts, & sixe degrées vnto the South parts.

The vse of the Zodiacke.

The vse of the Zodiacke is, through the mouing of the Sunne and Mone & the other Planets, to know in what signe they be, and also to know the time of the chaunge of the Mone, with all the other aspects: and in like manner to know the aspects of all the other planets vnto the Mone, & also the planets amongst themselues: and by the aspectes in the. xij. signes is gathered their effects, and in what countrey it may happen.

9. What the line Eclipticke is.

The line Eclipticke, is a circle in the very middle of the Zodiack, the which, the very middle or center of the Sunne doth goe vpon.

The vse of the line Eclipticke.

The vse of the line Ecliptick is this, if ỹ the Mone or any other starre, be vnto ỹ North part thereoff, thẽ it is sayd, that they haue North Latitude, & if vnto the South part, then they haue south latitude: and also by this circle called the line Eclipticke, is knowne the Eclipse of the Sunne and the Mone.

10. What the Articke polar circle is, being a paralel circle fixed.

The Articke polar circle is made by the pole of the Zodiack, or pole of the circle ecliptick. 23. degrées & a halfe in the heauens from the poles of the world aboue the horizon.

11. What the Antarticke Polar circle is, being a Paralel circle fixed.

The Antartick Polar circle is iuſt oppoſite vnto the artick polar, made by ẏ Antartick pole vnderneath our Horizon. The vſe of them I wil declare, when I ſpeake of the Poles of the Ecliptick or Zodiack.

12. What the tvvo circles called Colures be, &c.

The .2. circles called Colures, be thoſe ẏ do deuide the Zodiack, and all the other paralel circles into .4. equal parts, the one of the circles doth croſſe the Zodiack in the firſt poynt of Aries and Libra, and ſo paſſeth by the 2. poles of the world, & is called the equinoctial Colur: & the other Colure circle doth croſſe the Zodiack in ẏ firſt point of Cancer and Capricorne, & ſo paſſeth ẏ .2. Poles of the world, & there at the .2. Poles the one circle doth croſſe the other: & that is called the Solſticial colure.

The vſe of theſe tvvo circles.

The vſe of the .2. colure circles is this, ẏ Sun paſſing by them, doth deuide the yeare into .4. parts: as this, the Sunne in the firſt point of Aries, is ſpring time. &c.

13. What the .2. Poles of the vvorld is, imagined to be as an axiltree.

The .2. Poles of the world, imagined to be as an axiltree, (that is to ſay, the North pole called the pole Artick, & the South pole called the pole Antartick) the one is directly againſt the other: the North pole alwaies aboue your horizon, & the South pole antartick alwaies vnder our horizon, being fixed faſt in the heauens, & the Equinoctial iuſt & equally betwene them: and the cauſe why that it is imagined to be an axiltree is this, for that the whole heauens and all the lights of the Firmamẽt be caryed round about from the Eaſt vnto the Weſt in

xviiij. houres: so that no light nor place remaineth vnremoued, but onely the. 2. Poles of the world.

The vse of the Poles of the vvorld.

The vse of the. 2. Poles, is this, to know how farre we do transport our selues, & to know what climate & temperatenesse we be in, as touching heate and colde.

14. What the. 2. Poles of the zodiack is, imagined to be an axiltree in the heauens.

The. 2. Poles of the Zodiack, or Ecliptick, imagined to be as an axiltrée, (the artick pole of the Zodiack, or rather the ecliptick, & the Antartick pole of ỹ Zodiack) the one being directly against the other, & the Zodiack or rather the middle thereoff, called the Ecliptick, to be iust or equal betwéene them, are called the poles of the Zodiack: for that the Sunne and the Mone, & the other Planets & fired starres do moue vnto the Eastwarde, according to the standing of the Zodiack. &c.

The vse of the Poles of the Zodiack.

The vse of the. 2. Poles of the Zodiack is this, (as it is before declared) that the Zodiack is deuided into. 12. equal parts, called the. 12. signes, and those diuisions by imagination do passe vnto the poles of the Zodiack, in such forme as ỹ Meridiã lines do all méete at the poles of the world, & so do all those diuisions méete at the two poles of the Zodiack, & then any starre, ỹ is out of the zodiack, either vnto the Southwards, or Northwards, (according vnto those diuisions) they be called in the singes.

15 What the Zenith or vertical point is, imagined to be as an axiltree.

The Zenith or vertical point, is imagined to be a prick in the heauens right ouer the crown of your head,

and

and is moueable as we our selues be, & is as an axiltree vnto the horizon circle: and as you doe transport your selfe from one place vnto an other, so doth your Zenith or verticall poynt, and your horizon circle also.

The vse of the Zenith or verticall point. &c.

The vse of the Zenith or verticall point is this, to know how neare or how farre off any starre is from your Zenith, by taking the true heigth of any starre with an instrument, for that from your Zenith, is alwayes. 90. degrees down vnto the horizon on euery side round about you, as it shal more plainly appeare hereafter, where I speake of degrees.

16. What a degree is.

A Degree is the part or deuision of a whole circle, into. 360. equall parts, how bigge or small soeuer the circle be.

The vse of the degrees is manifold.

The vse of the degrees is to know by the Sunne & Mones course in the Zodiacke, or any other of the planets or moueable starres, how many degrees they be asunder: whereby is knowne at what time they haue any aspect the one with the other. And also by the degrees it is knowne, what latitude and what declination any light or starre hath from the Ecliptick or Equinoctial: & also the degrees will shew vnto you how many miles that you doe transport your selfe vpon the earth to the South or North parts, for ỹ euery Degree doth answer vnto. 60. English myles, in the going South & North: which is knowne by the altitude of the North pole, or the number of degrees betweene the equinoctial & your Zenith or vertical point, for from your Zenith vnto the horizon, is. 90. degrees to the Southwards, and. 90. degrees vnto the Northwards, which is halfe the com-

passe

passe of the heauens, for twice. 90. is. 180. and then the earth doth hide the other halfe of the heauens: & twice 180. maketh. 360. the whole contents of the compasse of euery great cirkle in the heauens.

17 What a Minute is.

Of Minutes there be two sorts, minutes of time, & minutes of measure, and is no other thing but the lesser part of tyme or measure, which is the. 60. part of a degrée, or the. 60. part of an houre: and all the diuisions in these matters, is by. 60. For as. 60. Minutes is a degrée or an houre, so. 60. secõds is a minute, & .60. thirds is a second, and. 60. fourthes is a third. &c.

18 Altitude is height: the vse thereoff.

ALtitude is the height of any thing taken, as the height of the sunne or any starre, or the height of the Pole, aboue the horizon: or the height of a steeple, or tower, or such other lyke.

19 Latitude is vvideneſſe: the vse thereoff.

Latitude is in the heauens: if the Mone, or any other starre be vnto the South partes or the North parts of the eclipticke, that then it is sayd, to be so many degrées in latitude or wydenesse, from the line eclipticke to the South or North part: and also Latitude is counted vpon the earth in like manner, if that you be in any place betwéen, from vnder the equinoctial, either to the South or North part, betwéene any of the two Poles, that you are so many degrées in Latitude from the Equinoctial. &c.

20 Longitude is length: the vse thereoff.

Longitude in the heauens is, if the sunne or Mone or any other starre, be in such a signe, and so many de-

grées: that then it is sayde: that they haue longitude, in such a signe & so many degrées. And also longitude vpon the earth, is counted from the Canary Ilands vnto the Eastward, as this, if that any towne or citie be vnto the Eastward so many degrées from the Canary Ilands, then it is sayd, that the citie or towne is so many degrées in longitude, wherby is knowne the time of the chaunges of the Mone, or any other aspect, or any Eclipse of the Sunne or Mone, at the citie or towne.

21 Declination is leaning: the vse thereoff.

Declination is counted in the heauens, if ỳ the Sun or any other starre be vnto the North part, or South part of the equinoctial, then it is sayde, that the Sunne or starre hath so many degrées of declinatiõ to ỳ south, or to the North parts, as it happeneth &c.

22 Circumference is the compasse of a circle by the outer edge.

23 Diameter is the bredth of a circle, passing right ouer ỳ center or middle therof, frõ outside vnto outside.

24 Center is the middle prick in any circle, equally distant from the edge of the circle in euery place.

25 A Paralel line or circle is, if two lines or more (how many soeuer there be) be equally distant in euery place alyke, being right lynes.

26 Auge, vvhat it is.

Auge is a point in the heauens, when the Sunne or Mone is erentrick, going nærer vnto the heauens, and further from the earth than hir common order is: and the oppositiõ thereoff is, when that the Sunne and Mone doe come nearer vnto the earth than they doe at any other time.

The vse thereoff.

The vse thereoff is, to know when that they be in

their

their swift motion, or in their slow motion: in the point of Auge, they be in their slow motion, in the opposition thereoff in their swift motion.

27 Excentrex, what it is.

Excentrex is when either the Sunne or Mone are towards the point of auge or the opposition thereoff, & then the Center of the sunne or Mones sphere is not in the Center of the earth, the vse thereoff is shewed in the Auge. Additiõs

28 What the head or tayle of the dragon is.

The head of the Dragon, is the place wher that the Mone doth come ouer the line ecliptick, frõ the South part, vnto the North part: and the taile of the Dragon is, where the Mone passeth ouer the line Ecliptick, from the North part, vnto the South part.

The vse of the head and tayle of the Dragon.

The vse of the head and taile of the Dragon, is to knowe, when that there is any Eclipse of the Sunne or Mone; and of what quantitie or greatnesse the Eclipse is.

29 Paralex, what it is.

Paralex is when that the Mone or the two Planets Venus or Mercurie are in coniunction or neare any Starre by the meanes of the Deameter or thickenesse that the superfices is from the center of the earth, and the neareneesse of them vnto the earth, that so accordingly, that in some partes of the Skyes it shall seme nearer or farther vnto those starres then in some partes, which reason groweth by the Cimideameter of the earth, for that you are not in the Center when that you doe beholde it. Additiõs

The vse thereoff.

The vse of Paraler is manyfolde, for ỹ it sheweth where & in what countryes that the Sunne is eclipsed, as in some places the sunne may be all wholely eclipsed, & in some place halfe eclipsed and in in some parts of the earth nothing eclipsed at all, and yet the sunne & the Moone both aboue the horizon, which reason is before shewed. And also the vse of Paraler is, if that you doe see any extraordinarie light in the heauens, as Comets or blasing starres, by their Paraler their distance is knowen what they are from the earth, and by their distanse their Deameater being taken, then the magnitude of the body is knowen, therefore there be great thinges to be knowen by the obseruation of the Paraler.

30 What Nauigation is.

Nauigation is this, how to direct his course in the sea, to any place assigned, and to consider in that direction what things may stande with him, and what things may stande against him, hauing consideration how to preserue the shippe in all stormes and changes of weather that may happen by the way, to bring the ship safe vnto the port assigned, and in the shortest time.

The vse of Nauigation.

The vse thereoff is this, first to knowe how that the place doth beare from him, by what wynde or poynt of the compasse, and also how farre that the place is frō him, and also to consider the streame, or tide gates and Currents, which way that they doe sette or driue the shippe, and also to consider what daungers is by the way, as Rockes and sandes, and such other lyke impediments, and also if that the wynde chaunge or shifte by the way, to consider which way to stande, and direct his

his course vnto the most aduantage, to atteine vnto the port in shortest time: and also if any stormes doe happen by the way, to cõsider how for to preserue the ship and the goods, and to bring hir safe vnto the port assigned. And also it is most principally to be considered & forseene, that if they haue had by occasion of a contrary tempest, for to goe very much out of the course or way, to know then how that the place doth then beare, that is to say, by what point of the Compasse the place doth stande from you: and also how farre it maye bee from you. Which way to be known is this: First to consider by what point that the shippe hath made hir way by, & how fast or slowly that the shippe hath gone, and to consider how often that the shippe hath altered hir course, & how much ỹ she hath gone at euery time, and then to consider all this in your Platte or Carde, and so you maye giue a neere gesse, by what poynt or winde it beareth from you, and also how farre it is thether. And also you may haue a great helpe by ỹ sunne or starres, to take the height of the Pole aboue the horizon, and also in some place you maye gesse by the sounding, both by the depth and also by the ground. And also it is very meete and necessary to know any place when that he doth see it.

31 Of instruments to vse at the Sea for to take the height of the Sunne or any Starres.

ALl Instruments to take the height of the Sunne, or any starre, the Originall of the making thereoff, it is either a Circle, or the parte of a Circle, whose diuision is the 360. part of a Circle, what forme soeuer that it hath, as your crosse staffe it is marked according vnto the proportion of a Circle: and euery one of the degrees is the equall part of a Circle the three hundred and sixtie part &c.

The vse of the Instruments.

THe vse of the Instruments, as Astrolobes, or common rings, or the crosse staffe, is to take the height of the Sunne or other starres, whose vses doe follow hereafter in the booke.

32 What manner of persons be meetest to take charge of Shippes in Nauigation.

As touching those persons ỹ are mete to take charge, that is to say, to be as master of shippes in Nauigation, he ought to be sober and wise, and not to be light or rash headed, nor to be to sumish or hastie, but such a one as can well gouerne himselfe, for else it is not possible for him to gouerne his company well: he ought not to be too simple, but he must be such a one as must kepe his company in awe of him (by discretion,) doing his cõpany no iniurie or wrong, but to let them haue that which men ought to haue, & then to se vnto them that they doe their labour as men ought to do, in al points. And the principal point in gouernment is, to cause him selfe both to be feared & loued, and that groweth principally by this meanes, to cherish men in well doing, and those men that be honestly addicted, to let thẽ haue reasonable preheminence, so that it be not hurtefull vnto the Merchaunt nor to himselfe, & to punish those that be malefactors & disturbers of their company, and for small faults, to giue them gentle admonition to amend them: and principally these two points are to be forese ene by the masters, (that is) to serue God himselfe, & to se that all the whole company doe so in like maner, at such conuenient time as it is mete to be done: the second poynt is, ỹ the master vse no play at the dice or cards, neither (as nere as he can) to suffer any, for the sufferaunce therof may do very much hurt, in diuers respects:

respects: & furthermore, ỳ master ought to be such a one as doth know the Mones course, wherby he doth know at what time it is a full sea, or a low water, knowing in what quarter or part of the skye that ỳ Mone doth make a full sea at that place, & also the master ought to be acquainted, or know that place well, ỳ he doth take charge to go vnto (except that he haue a Pilot) & also he that taketh charge vpon him, ought to be expert, how the tide gates or currẽts do set from place vnto place: & also not to be ignorant of such daungers as lyeth by the way, as rockes, sandes or bankes, & also most principally, he ought to be such a one, as can very well direct his courses vnto any place assigned, & to haue capacitie how for to handle or shifte himselfe in foule weather or stormes. And also it behoueth him to be a good coaster, that is to say, to know euery place by the sight thereoff. And also he that taketh charge for long voyages, ought to haue knowledge in plats or cards, & also in such instruments, as be mete to take ỳ height of the Sun or any starre, & to haue capacitie to correct those instrumentes, and also he ought to be such a one, that can calculate the Sunnes declynation, or else to haue some true regimẽt, & also he ought to know how to hãdle the Sunnes declination, when that he hath taken the height of the Sunne.

Now beginneth the Regiment for the Sea, the first Chapter of Nauigation, and shewveth what the .32. poyntes of the Compasse is, and to what vses they doe serue.

THe first and most principall thing for any Seafaring man, or Traueller, is to know toward what part of the Earth he meaneth to go, & then beeing vpon the Sea, there he seeth no path nor marke to trauell by, but only ỳ vse of ỳ Needle or compasse. And to shew the cause how they in old time did finde thẽ or called thẽ, is sufficiẽtly declared by other, but this is to be noted: ther

be

Eight capitall or heade points.

be eight capitall or head windes or points, whereoff .4. of them are called Cardenalles, and haue their names properly of them-selues, & the other foure of them, are deriued or take their names of ỳ other foure, as this: South commeth directly from the meridian, & North is directly against it, and East commeth from ỳ Equinoctiall poynt, towards the parts of the Sunne rising, and West is right against it, Northeast is in the midway betwéene the East and the North, and Southeast in the midway betwéen the East and the South, and Southwest betwéene the West & the South, and Northwest is in the middle betwéene the Noth & the West. And

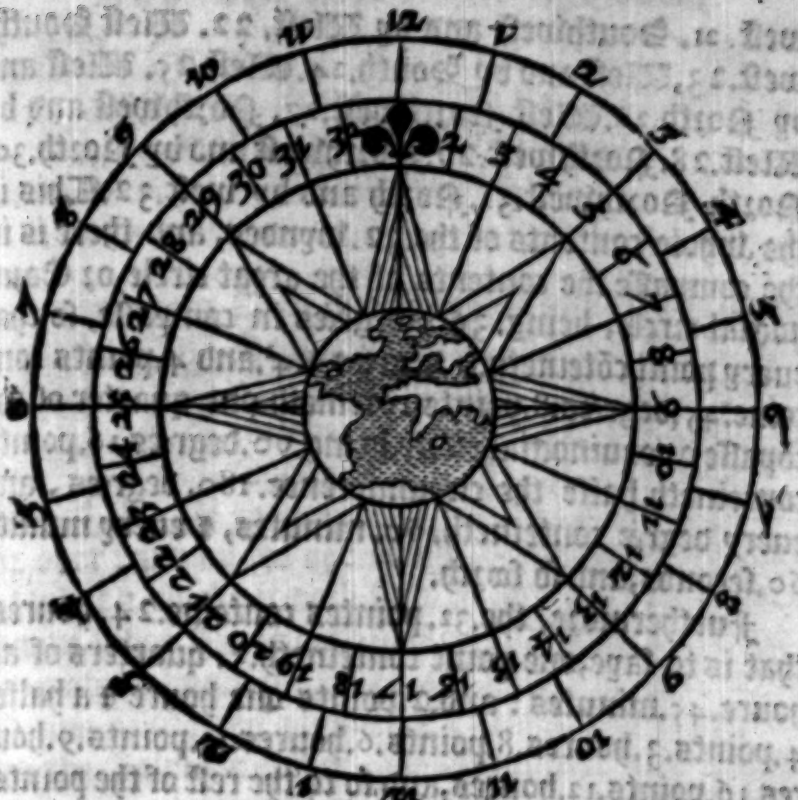
Eight inferiour poynts or vvindes.

then ther be eight inferior points or windes, halfe way betwéene euery one of those 8. capitall or head points or windes, & those haue ỳ names of ỳ two points ỳ he stãdeth betwéene, as ỳ point ỳ standeth betwéene ỳ North and the Northeast, is called North Northeast and that point betwéene the East and the Northeast, is called, East Northeast, and also that poynt that is betwéene the East and the Southeast, is called East Southeast. And so forth vnto ỳ rest of ỳ .8. poynts, whose names doth follow, as South Southeast, & South Southwest, & west southwest, & west northwest, & north northwest: & now betwéene euery one of these inferiour poynts, & euery one of ỳ head windes ther is a bypoint or winde, and he is called a bypoint, for that he is not named but by the name of one of the head poynts next adioyning.

16. bypoynts or vvindes.

There be .16. of them in number, so that ther be eight capital or head points, and eight inferiour poynts, and 16. bypoints or windes, so that in all there bée .32. of them. The vse of these poynts is, to direct the shippe to what quarter of the world you do assigne, to keepe that course to finde the place so assigned, for that the propertie of the Nædle or Fiye, is alwayes to stande due South and North.

As



AS touching Nauigation, for the instructions of the meanest, I haue set this figure or compasse, where first is to be noted the. 32. windes & points of the compasse aboue made. The Flourdeluce is the first point, and these be the names, beginning at the North, and so with the course of the Sunne, according vnto the common order that Sea men doth teach or instruct their youth, which is this. North. 1. North and by East. 2. North Northeast. 3. North east and by North. 4. Northeast. 5. Northeast & by East. 6. East Northeast. 7. East & by North. 8. East. 9. East & by South. 10. East Southeast. 11. Southeast & by East. 12. Southeast. 13. Southeast and by South. 14. South Southeast. 15. South and by East. 16. South. 17. South & by west. 18. South Southwest. 19. Southwest and by South. 20. South-

The names of the 32. poynts of the compasse.

west. 21. Southwest and by West. 22. West Southwest. 23. West and by South. 24. West. 25. West and by North. 26. West Northwest. 27. Northwest and by West. 28. Northwest. 29. Northwest and by North. 30. North Northwest. 31. North and by west. 32. This is the whole contents of the. 32. wyndes, and there is in the compasse the contents of the great circle, or Equinoctial circle, being. 360. degrees in compasse, so that euery point cõteineth. 11. degrees ꝛ. 4'. and 4. points conteine. 45. degrees. 8. points cõteineth one quarter of the cõpasse or equinoctial circle, being. 90. degrees. 16. points conteineth halfe the circumference. 180. degrees, and euery degree conteineth. 60. minutes, ꝛ euery minute 60. seconds, and so forth.

The contẽts of the Equinoctial circle. 360. degrees: one point of the Compasse conteineth. xi degrees & a quarter.

Furthermore, the. 32. pointes conteine. 24. houres, that is to saye, one point conteineth. 3. quarters of an houre. 45. minutes: and. 2. points one houre ꝛ a halfe, 4. points. 3. houres. 8. points. 6. houres. 12. points. 9. houres. 16. points. 12. houres, and so to the rest of the points. And euery houre conteineth. 60. minutes: and euery halfe houre. 30. minutes, ꝛ euery quarter of an houre. 15 minutes: and after that rate. 45. minutes maketh three quarters of an houre.

The. 32. pointes brought into. 24. houres.

The

¶ The second Chapter treateth of the Golden number or Prime, shewing the Epact, and by the Epact, to know the age of the Moone.

IT is necessary and conuenient for the Seafaring men, to know the Prime or Golden number: for by the golden number is knowne the Epact, and the Epact sheweth the age of the Moone or chaunge day, within.12. houres vnder or ouer: and by the age of the Moone, you may know at what a clocke it doth flow in any place that you do know what Moone doth make a full Sea: therefore it is méete to know the Epact, and that is knowne by the Prime, or Golden number. The cause why it was called the Golden number, was bicause it was sent out of Egipt in letters of gold, to the Romaines or Citie of Rome.

The cause why that it is called the Prime, was for that it was the first order that the Moones course was knowen by, & it is thus knowne. Adde one to the yeare of our Lord that you would know the Golden number or Prime of, then deuide the number by.19. the remainer is the Prime: and multiply that by.11. and loke what the number commeth vnto, deuide that by.30. the remainer is the Epact. Then when you haue once the Epact, adde.11. to your Epact for euery yeare more, and loke what that commeth to, that is your Epact: and if it doe passe.30. put that away, and keepe the remainer for your Epact. And thus this rule will serue for euer, sauing when the Prime beginneth at one, for then the Epact is.11. and then doe (as aforesayd) as you may perceiue by this table here folowing.

The cause why that it was called the Prime or Golden number.

To know how many the Epact is.

¶ The table of Prime and Epact

for, xix. yeares, and when thoſe, xix. yeares be ended, then beginne againe, and ſo it will ſerue for euer. &c.

The yere of the Lorde.	Prime.	Epact.	The yere of the Lorde.	Prime.	Epact.
1579	3	3	1589	13	23
1580	4	14	1590	14	4
1581	5	25	1591	15	15
1582	6	6	1592	16	26
1583	7	17	1593	17	7
1584	8	28	1594	18	18
1585	9	9	1595	19	29
1586	10	20	1596	1	11
1587	11	1	1597	2	22
1588	12	12			

The Prime is the time of .19. yeares.

THe Prime or Golden number, is the time of .19 yeares, in the which time the Mone maketh all hir changes or coniunctions with the Sunne, & when these nynténe yeares be expired, then she beginneth againe: as for example. This yeare being the yeare of our Lord, 1579. she chaunged the 26. day of March, & euery yeare doth alter .11. dayes of hir change, till ỳ yeare. 1598. & then she changeth the said .26. day of March again, as I shewed you before: the epact is ỳ putting to .11. for euery yeare. Now furthermore to know ỳ age of the Mone, do thus: take the nũber of the Epact for your yere (beginnig at March alwaies) & reckẽ how many months it is frõ March, (coũting March for one) then

then recken how many dayes of the Moneth it is, in which you would know the age of ẏ Mone: Then put all your numbers together, (ẏ is to say, your Epact, your moneth frō March & euery day of ẏ moneth) then loke how many it amounteth vnto, that is the age of the Mone, but if it passe .30. throwe all the .30. away, and kæpe that which will not be .30. for when the age of the Mone is iust .30. then is it the chaunge day: & if it be the fiftænth day of the age of the Mone, thē the Mone is at the full. When the age is betwæne seuen dayes and eight, then is ẏ first quarter. And if it be 22. dayes olde, then the mone is at the last quarter: as for example, this yeare 1579. I loke and finde the Epact 3. for the yeare: now I would know ẏ age of the Mone the 13. day of June. Now I recken how many moneths it is from March, reckening March for one, & I finde it is foure moneths: then I take and adde all these together, that is to say. 3. for the Epact, & foure for the moneths (ẏ is to say, March, April, May, June,) and then 13. for the dayes of the moneth, and all commeth to 20. So that you may conclude, that the Mone is 20. dayes olde, and was at the full 5. dayes before.

To know the age of the Moone by the number of the Epact.

The thirde Chapter treateth how to know by the age of the Moone, what houre it doth flow, or is full Sea at any place, where you doe know what Moone maketh a full Sea.

NOw by ẏ age of the mone you may know at what houre it is a ful sea in any place wher you do know what Mone maketh a ful sea, which rule commonly the sea men call, the shifting their sun & mone: & many wayes ther be to do it, for thus they may do it: let thē diuide one houre into fiue parts, & then take 4. of those parts, & put the fifth part away, that serueth for the alteration of 24. houres, & the foure fift parts of an houre are 48. minutes, & the 5. part of an houre, is 12. minutes

To know the altera tion of the tides

in 24. houres. An ensample for the full Sea vpon the lands end, for euery day of the age of the Moone.

A flood and an ebbe doth alter 24. minutes forwards; as this for example: it floweth 12. of the clock at the lands ende, vpon the change day, the mone being in the South: at all times a full sea. The Mone being one day olde, it floweth 12. of the clocke 48. minutes, 2. dayes olde, it floweth, one of the clock 36. minuts. 3. dayes old, it floweth 2. of the clock 24. minutes: foure daies olde, it floweth 3. of the clock 12. minutes: fiue daies olde, it floweth 4. of the clock iust: fire daies olde, it floweth 4. of the clock 48. minutes: seuen daies olde, fiue of ỳ clock 36. minutes: eight daies old 6. of the clock 24. minutes: nyne daies olde, seuen of ỳ clock 12. minutes: ten daies old, it floweth 8. of the clock iust: eleuen daies olde 8. of the clock 48. minutes. 12. dayes 9. of the clocke 36. minutes: 13. dayes old 10. of the clock 24. minuts. 14. daies old, it floweth 11. of the clock 12. minuts: xv. daies olde, it floweth xii. of the clock iust, then being the ful Mone: & so begin againe as you did before at one daye olde, & so forth. For the course of the tides is nothing else but to adde for euery daye of the age of the Mone one houre, pulling back ỳ fifth part of an houre (being xii. minuts) & by this accompt you may at all times know at what a clock it doth flow, by putting to euery floud & ebbe. 24 minutes, & to 2. flouds & 2. ebbes putting to 48. minuts.

To shift the Sunne and the Moone by the points of the Compasse

Now furthermore the seamen vse to make their accõpt by this meanes (but it is all one) they do allow for euery day of the age of the Mone, one point & 3. minutes: for a point of the compasse conteineth 45. minutes, ỳ is 3. quarters of an houre. Then they put 3. minuts to. 45 minuts, which maketh. 48. minuts, the said 3. minuts is the xv. part of a point, & frõ the change to the full is xv. daies, so ỳ (the halfe cõpasse being 16. points) they breake the odde point into xv. parts, & ỳ commeth to. 3. minuts, so ỳ the alteration of the tides, for euery 24. houres, be 48. minutes, or the 4. fifth parts of an houre. Wherfore

there

there shall follow a table of tides about certein places of this realme: for euery Moone conteineth 29. daies. 12 houres. 44. minuts frō change to change: the whole cōtents of the houres of the Moone, be. 708 houres, & .44. minuts. And ther is in euery yeare 12. changes of the Moone: & the yeare cōteineth 365. daies. 5. houres. 55. minuts. 13. secōds. Yet some do affirm to be odde. 6. houres, but there lacketh. 4. minuts. 47. seconds in the tropicall yeare. Likewise in the yere be. 12. moneths agreeable to the. 12. Moones: the. 12. Moones conteine but. 354. daies, so ỳ there be. 11. daies more in the yeare, than ther be in the 12. Moones. The yeare also is deuided into. 12. moneths, which moneths haue taken their names at ỳ will & plesure of men: as first January was so called, of Janus, bicause of. 2. heads, for the month of January beholdeth the ende of the yeare past, & the beginning of the yeare to come. February toke his name of certein Roman sacrifices called Februa. March is so called of Mars, for Romulus so named it after his father. April comes of Aperio, bicause ỳ then the earth is opened. Maie of Maia, the mother of Mercury. June so called by preparing to the war. July of Iulius Cæsar: & August of Augustus Cesar, for in ỳ month he entered the Cōsulship: then the rest of the months toke their names of their nūber frō March. Now these 12 months which maketh the yeare, the Sun doth passe or go through the Zodiack called ỳ 12. signes, which is the occasiō of ỳ yeare, for this is to be noted, ỳ ỳ Sun, as I said before, doth go by his natural mouing in. 365. daies. 5. houres. 55. minuts. 13. secōds, through the zodiack, cōteining 360. degrees, his course being against ỳ. 24. houres, going from the west into the East, against the course of primū mobile, or first mouer, being moued by ỳ mighty prouidēce of God, which maketh ỳ. 24. houres: & so doth all the vij. lyghts or planets, (except) that it be in their retrogration: but the Sunne & the Moone, be

The contēts of the nūber of dayes and houres in one Moone: the houres in euery Moone be 708. 44 minutes.

The content of a a yeare is 365 daies 5. houres 55. minutes.

How the monethes toke their names.

The Zodiack containeth 360. degrees.

The mouing of. 24. houres.

be neuer retrograt, as the other .5. planets or lyghts be.

The time that the moone goeth thorow the 12. signes

And this is to be noted, that ☽ Mone goeth faster then the Sunne, for she goeth through the whole Zodiack, in .27. dayes and .8. houres. Now in that same time the Sunne is remoued by his naturall mouing from that place of the Zodiack nere 27. degrees: and then bicause that the Mone hath not found the Sunne ther, it is 2. dayes, foure houres, and foure and forty minutes more, before that the Mone ouertaketh the Sun againe, so by that meanes, it is 29. dayes, twelue houres, and 44. minutes betweene the chaunge of the Mone and the nert chaunge, one Mone with an other thorow the yeare, although that ☽ Mone may chaunge sometime in lesse time, and sometime in longer time,

The three motions of the Moone.

that is by the meanes of ☽ three motions of the Mone, that is to say hir swift motion, and hir middle motion, and hir slow motion, which groweth by the meanes of the Mones Auge or opposition thereoff. The Mone being in Auge, goeth but little more then 12. degrees in 24. houres And in ☽ opposition of Auge nere 15. degrees in 24. houres, & in hir middle or equall motion 13. degrees 12. minutes. So this is the occasion why sometime the Mone may chaunge soner or be detracted longer then the time of 29. dayes 12. houres, and 44. minutes. This poynt of Auge is moueable, & doth passe thorow the Zodiack in the time of 19. yeares: and it causeth sometime the full of the Mone to happen soner and later. In lyke maner also ☽ quarters of the mone with all the other aspects that the Mone hath with the Sunne, or any other of the planets according to the mones motion. In lyke manner (by the meanes of the 3. motions of the mone) sometime ☽ mone goeth more then one point & 3. minutes, in 24. houres, & sometimes lesse then one point & 3. minutes, as this for example: the mone being in hir slow motiō, goeth but little more

Of Auge.

Thecause why the Moone changeth rather or later.

The moone goeth in 24. houres somtimes

then

then.12.degrées in.24 houres, & then the Sunne in that time doth go one degrée: and then is there but 11.degrées betwéene the Sunne & the Moone (that is, but.44. minutes.) So that the Moone is not one point in.24.houres from the Sunne. But being in hir swift motion she goeth nére.15.degrées in.24.houres, and the sunne goeth one degrée in that time: so that there is.14.degrées in xviiij.houres, betwene the Moone & the Sunne, (that is.56.minutes) which is a point, and.11. minutes. Wherefore I doe thinke it very necessary for to shew somewhat of the Moones motion, that they may know when that the Moone is either in hir swift motion or hir slow motion, for that I doe know that there is not in respect, no Seamen that doth know it. For that I doe know no one seaman that hath any sight or knowledge in the Moones Theorer, therefore lette them note these few wordes following.

more degrees, and sometime fewer degrees.

The Moone is not one point asunder frō the Sunne in.24. houres.

Additiōs

When that the Prime is one, then the point of auge is in the first part of Aries, then the Moone being ther, she is in hir slow motion. So in lyke manner the Moone being in Libra, in hir swift motion for that it is the opposition of the Moones auge, and so in the tyme of.19. yeares, the point of auge doth goe thorow the.12.signes. So that in 9.yeares and a halfe, the point of auge is in Libra, and then the Moone being in Libra, she is in hir slowe motion, going about.12.degrées in.24.houres. So that then the Moone being in Aries, she goeth.xv.degrées in.xviiij.houres, for that there is the opposition of auge. And also when the Prime is fiue, then the point of auge is in Cancer, and then there being in hir slow motion. So that when that the Moone is in Capricorne, then in hir swift motion. And when the Prime is.xiiii.or.xv. then the Moones auge is in Capricorne, and then there the Moone is in hir slow motion, and also in Cancer hir swift motion. And this by considering what that the

Prime is, you may know where that the Mones auge is, which is very necessary for seamen for to know in diuers respects. For if ☽ the Mone doth come from hir swift motion, then it causeth the change, quarter, or full of the Mone to be the rather. But contrarywise, when that the Mone commeth from hir slowe motion, then that dothe detract the time the longer before the Mone doth change, or is at the full or any other aspect.

And thus much I haue sayde of the Mones motion: for that some seamen will take vpon them to correct the Almanakes as touching the change & quarters of the Mone: holding this opinion, that euery Mone ought be equal in ☽ number of the dayes and houres: and the full Mones to be iust the halfe contents. And the quarters in lyke manner, the iust fourth part in dayes and houres, so that some of them will take vpon them to tell (by the rule of the epact,) the true houre of ☽ change, quarters, and full of the Mone. Wherein they are notably deceiued.

The Moone is in. 24. houres. 1. point and 11. minuts asunder from the Sunne. Errour of Mariners

Againe, sometime in the yeare you shal see the mone rather than at some other tyme, as this for example. From January to June you shall see the mone within xviiij. houres after the change: because she hath North declination of the Sunne, and maketh a bigger arche than the Sunne. From July to December, you shal not see the mone three daies after the change: because hir declination is to the South part of the Sunne: but you may see hir in. xviiij. houres, before hir change. Now the seamen do imagine a prime day, which is the half quarter of the mone: that is, when the mone is three daies and. 18. houres olde, (the mone being then foure points to the Eastward of the Sunne, which is. 3. houres:) the same rule may they in like case obserue whē the mone is past the full. 3. dayes and. 18. houres, and also in the middes of the quarters.

Heere

¶Heere foloweth a table of Tides.

FIrst, the Mone South or North: on Landes ende full Sea.

The Mone South and by East: at the Ooze ende full sea.

The Mone South Southwest: betwæn holy Iland and Tinemouth, full sea.

It floweth betwæne Tinemouth and Flamborough head, Southwest, and Northeast mone.

It floweth betwæne Flamborough head and Bridlington, in the Bay: a Southwest and by west mone.

The Mone in the west Southwest: betwene Bridlington and Laurenas, full sea.

It floweth betwene Laurenas & Cromer all along the well: an East and west mone.

It floweth betwæne Cromer and Yarmouth Rode, to Laystow North Rode: a Southeast mone.

It floweth betwene Laistow Rode & Orfordenas: a Southeast and by South moone.

It floweth betwene Orford, and Orewell wondes: a South Southeast moone.

It floweth betwene the Naase and the Ware head of Colne a South and by East moone.

It floweth at the Spittes and at the Sheue and all alongst the Swinne: a South moone.

At the west ende of the Nore: a South & by west moone full sea.

It floweth at Grauesend: a South southwest mone.

It floweth at London bridge: a Southwest moone.

It floweth at the North Forlande: a South Southeast moone, & so alongst the coast till you come to Bechey. And in the Ostyng from ỳ North Forland to the South Forland: it runneth halfe tide. And frō ỳ South

E

Foꝛland to the Naaſe: the tide runneth halfe tide halfe quarter. And from the Naaſe to Fairely: it runneth halfe tyde, & from Fayꝛely to Beche: it runneth quarter tide vnder other.

It floweth to the Weaſtward of Beche, a kenning: a Southeaſt and by South Wone.

It floweth at Poꝛteſmouth: a South and by Eaſt Wone.

It floweth at S. Elens: a South Southeaſt Wone.

It floweth on the ſea ſide of the Iland: a Southeaſt and by South Wone: and ſo on the lande, and at the Nædles, and runneth quarter tyde in the Oſtonne.

It floweth at Wole in the Yauen: a Southeaſt Wone.

It floweth at Waymouth: an Eaſt & Weſt Wone.

It floweth at Poꝛtland: a Southeaſt Wone.

It floweth from the Weaſt part of Poꝛtlande, till you come vnto Plymmouth: an Eaſt & Weſt Wone.

It floweth on the ſhoare from Plymmouth to the Lyzard: a weſt and by South Wone. And in the Oſtonne a Southeaſt Wone.

It floweth at Mounts Baye: an Eaſt and Weſt Wone.

It floweth at Selly: a weſt and by South Wone.

It floweth at the Landes ende of Golfe: a weſt South weſt Wone.

It floweth all alongſt the coaſt vp to Bꝛiſtow, and the coaſt of Ireland, from waterfoꝛd to Kinſale: a weſt and by South Wone.

Furthermoꝛe it floweth (foꝛ the moſt parte) from the Woll head of Burdeauz all alongſt the coaſt of Bilkey, Galyza, Poꝛtingale, till you come to the ſtraights of Waliga, a Southweſt and Noꝛtheaſt Wone.

It floweth at Flulhing: a Southweſt & by South Wone.

It floweth at Antwerp: an East and west Mone.

It floweth all alongst the coast of Flaunders, from the wildings to Calys, a South and by East Mone: & so runneth halfe a tyde vnder the other.

Now here is one speciall thing to be noted, & that is this: It floweth one point of the Compasse more in the spring streames, than it doth in any of the quarters of the Mone, (so that it be a Ryuer where there is any indraft, hauing distance from the sea) when there is neither rage of wyndes, nor any cause either to hinder or further the sayde effect.

It will flovv a point of the compas more in the springe tides than in the neap tides in a riuer that hath any distance vnto the sea.

As for example thus: It floweth at Grauesend at the change of the Mone or full, a South Southwest Mone. But in any of the quarters of the Mone it scant floweth a South and by west Mone: and this is generally for euer.

¶ The Fourth Chapter treateth of the Sunne & Moones course in the Zodiacke: and how you shall knowe what houres the Moone shall rise and set at: and at what point of the Compasse: with other necessary thinges.

FUrthermore, the Sunne (by his naturall mouing through the twelue Signes in the Zodiacke, in the yeare) doth cause the height and lowneste of his Declination: which is necessary for the seafaring men to know, in which declination they doe take from equinoctiall to Equinoctiall: and this is to be noted, that as the Sunne hath declination, so in lyke manner hath the Mone, for by hir declination, & the sunne, is knowen the tyme of hir shining or abiding aboue our Horizon. The Sunne or Mone in the first minute of Aries, doe

To knovv how long the Mone shyneth.

rise East, and sette west, and shine. 12. houres. In the first minute of Taurus, they rise neare the East Northeast, and set neare the west Northwest, & shine somewhat more then. 14. houres. In ỳ signe of Gemini: they rise neare the Northeast and by East, & they set neare the Northwest and by west, and shine neare. 16. houres. In the signe of Cancer, the first minute: they make their greatest declination to the Northwardes, and they ryse neare the Northeast, and set neare the Northwest and shine neare. 16. houres and a halfe. In the first minute of Leo, (descending towards the equinoctiall,) as they did in Gemini. And in the signe of Virgo, as they did in Taurus. And in the first minute of Libra, Equinoctiall: beginning South declination, as in Aries. And in the first minute of Scorpio, they rise neare the East Southeast, and set neare the West Southwest, and shine. 10. houres. In the first minute of Sagittarius, they rise nære the Southeast and by East, and set neare the Southwest and by west, and shine. 8. houres. In the first minute of Capricornus, they haue their greatest declination to the South, & begin to returne to the equinoctiall, rising neare the Southeast, and setting neare the southwest, and shine. 7. houres and a halfe. In the first minute of Aquarius, as in Sagittarius. In the first minute of Pisces, as in Scorpio. Now by this rule you may know the rising and setting of the Moone for euer: as thus: I haue shewed you before in the shifting of the Sunne and Moone, that for euery day of the age of the Moone, the Moone goeth Eastwarde one point and. 3. minutes: in. 2. daies. 2. points and. 6. minutes &c. Now when you list to knowe the very houre and time of hir rising: Looke how many dayes the moone is olde, then put so many points, & so many. 3. minutes, & looke what it amoũteth vnto. But or euer I say any more in those matters, here is one special thing to be noted, ỳ is, when

To knowe what houre or poit the Moone riseth or setteth.

that the Mone doth change, & then the Mone & the Sun be both vnder one like degrée & minute of any signe of the Zodiack. The ful moone is, when the Sunne & the Mone be oppolite (ỳ one being directly against ỳ other, & iust. 6. signes asunder) as you may perceiue at the ful Mone: for then when the mone riseth, the Sun setteth: & when the sunne riseth, ỳ mone setteth. The quarters be, when ỳ Sun & Mone be iust. 3. signes asunder, (that is, iust. 90. degrées.) Now whē you list to know ỳ very time of the Mones rising or setting, loke in your Kalē-der, what signe & degrée the Mone is in: then according to the rule of the shining, deuide ỳ into. 2. equall parts, then frō ỳ South, so shal you sée at what houre ỳ mone riseth, as for example this. In March alwaies the Sun is in Aries, then ỳ moone being in hir first quarter, thē she is. 6. houres to the Eastward of the sunne, then the mone must nédes be in Cancer. Then shineth ỳ mone in our Horizon. 16. houres & a halfe, then the moone is south at. 6. of ỳ clock, thē she shineth, 8. houres & a quar-ter after. 6. of the clock. So ỳ she setteth at. 2. of ỳ clock & a quarter of an houre past, then she riseth in the day, 8 houres & a quarter before. 6. of the clock, ỳ is, at. 9. of the clock & .3. quarters of an houre past. Now at ỳ last quar ter in March, then ỳ Mone must nédes be in Capricor-nus, thē shineth the Mone but. 7. houres & a halfe, thē the moone is south at. 6. of the clock in the morning, thē the Mone riseth. 3. houres & .3. quarters before, that is, at. 2. of ỳ clocke & a quarter of an houre past in the morning, then she setteth by day at. 9. of the clock & .3. quarters of an houre past, & this rule will serue for euer, without a-ny great error. But yet ther is a further matter for the exact doing, which is the Latitude of the Mone frō the head or taile of the Dragon.

Of the change.

Of the ful Moone.

Quarter of the Moone.

Ensample of the Moones rising and setting.

The Moone hath Lati-tude.

And now for to show vnto you whē that the Mone is with the head & the tayle of the dragon, as I haue in

the

the third Chapter sayd vnto you, there is but few seamen that dothe knowe the Mones Theorar, for that they cannot tell when that the Mone is in hir swift motion or slow motion. So in lyke manner it is necessary for to knowe the Mones Latitude from the lyne Ecliptick, and also of which side of the lyne Eclipticke, which is knowne from the head or tayle of the Dragon. For when that the Mone hath passed. 90. degrees from the head of the Dragon, then the Mone hath Latitude fiue degrees vnto the Norths parts of the lyne Ecliptick, & also, if that the Mone be. 90. degrees from the Dragons tayle, then the Mone hath Latitude fiue degrees vnto the South parts of the lyne Ecliptick. So that the dragons head is no other thing but the crossing or passing of the Mone from the South parts vnto the Norths part of the lyne Eclipticke. So in lyke manner the Dragons tayle is the crossing or passing of ẏ Mone ouer the lyne Eclipticke from the Norths part vnto the South parts of the lyne Ecliptick. The effects of that is, if that the Mone doth come with the head or tayle of the Dragon at hir opposition or full, that then ẏ Mone shalbe eclipsed, for that then the shadow of the earth is sæne vpon the Mone, and these eclipses be generall thorow the face of the whole earth, so that the Mone is aboue the Horizon. And in lyke manner, if that ẏ Mone doth come with the head or tayle of the Dragon at the coniunction or change of the Mone, then the Sunne is eclipsed, for that the Mone commeth betwæne the Sun and the earth, but these eclipses are not general, for that the Deameter of the earth is more then fiue times the Deameter of the Mone: and also the Mone commeth very neare vnto ẏ earth in respect of the great distãce that the Sunne is from the earth, so that the Sunne may be eclipsed in one place but not in an other, which doth happen by the Mones Paralex, as afore I haue

shewed

shewed.&c. And now for to know where the Dragons head is, note this, when that the Prime is one, then the Dragons head is in the first part of Aries, as the point of auge is. But now their motions is contrary: For as the point of auge is in Aries, and so commeth into Taurus, and so proceding thorow the. xij. signes in. 19. yeares. So the Dragons head doth passe thorow the xij. signes in. 19. yeares backwardes, as being in Aries, so it cõmeth into Pisces & so into Aquarius, &c. So that in. 9. yeares & a half, the Dragons head is in Libra, and doth mete with the point of auge. &c.

And now for to know the Mones Latitude, marcke this, the Prime one, the Dragons head is in Aries, so that when the Mone is in Cancer, then she is. 90. degrees from the Dragons head, and then the Mone hath hir farthest distance from the lyne ecliptick, that is fiue degrees. So that the Mone dothe declyne fiue degrees more vnto the Northwardes then the Sunne doth. So that the Mone doth declyne in all. 28. degrees and a halfe, from the equinoctiall, and so when ỹ the Mone doth come towardes the Dragons tayle, which is alwayes oppolit vnto the Dragons head, the Prime one, the Dragons taile is in Libra, so the Mone passing Cancer, the Mone commeth nearer the eclipticke. So in Libra, the Mone crosseth the lyne eclipticke, and then when that she is come into Capricorne, then she is fiue degrees vnto the Southwards of the lyne ecliptick, and then she declineth. 28. degrees & a halfe. vnto the Southwards of the equinoctiall. So that the Mone dothe decline in all, medling not with the Mones Paraler. 57. degrees, the Prime being one, and so in. 9. yeares and a halfe, the Dragons head shalbe in Libra, and the tayle in Aries, and then the Mone in the signe of Libra, shal passe ouer the lyne Eclipticke from the South part to the North part. So that the Mone in the signe of Ca-

pricorne, is fiue degrées vnto the North of the lyne Ecliptick, and then she doth declyne but. xviij. degrées and a halfe from the equinoctial to the South partes, and so in the signe of Aries, the Mone shall passe ouer the lyne Eclipticke from the North vnto the South, and then in Cancer, the Mone is fiue degrées vnto ỳ South of the lyne eclipticke, and doth declyne. xviij. degrées vnto the North parts of the equinoctial, so ỳ the Mones whole declination is but. 37. degrées. So when the Prime is one, the declination of the Mone is more by 20. degrées then when the Prime is betweene nine and tenne yeares. And when the Prime is neare fiue, then the Dragons head is in Capricornus. And when the Prime is. xiiij. or. xv. the Dragons head is in Cancer. So that in. 19. yeares the Dragons head dothe passe through the. 12. signes backwardes. And this by knowing what the Prime is, you may know where the Dragons head is, and also the Dragon tayle, and then that knowne, you may know the Mones Latitude from the lyne eclipticke, and of which syde: For the Mone with the Dragōs head, then she passeth ouer from the South vnto the North parte, and the Mone with the Dragons tayle, then she passeth ouer from the North vnto the South part of the lyne Eclipticke, and then when that the Mone is halfe way betweene the head and the tayle of the Dragon, then the Mone is fiue degrées in Latitude from the lyne Ecliptick, if that she come from the head of the Dragon. Then on the North syde, if from the tayle, then on the South side of the lyne Ecliptick, & this I doe thinke sufficient for instruction.

Yet there is one thing which I would Seafaring men should consider, although a great number be expert in that, yet it is méete to be spoken off, as this. The Sunne being in Cancer, or Mone in like manner,

or

or in Gemini, or any tyme when the Sunne or Mone hath North declination, they will set their Compasse before them, and when they see the Sunne giue an East shadowe, they will say that it is .6. of the clocke, which and if the Sunne be in Cancer, it is not much past fiue of the clocke, and the more to the Southwardes, the more they doe erre.

You cannot know what a clock it is by y compasse, the Sun being in the North signes.

And in like case, the Mone being in Cancer, when they doe see the Mone giue an East shadowe by their Compasse, they will say the Mone is West, but they doe not consider, that the Sunne and the Mone being in Cancer, commeth so neare our Zenith or Verticall point right ouer our head, which is the very height of their declination, comming so neare them, therefore they must iudge the Easte or West from the Pole or North starre, if they will iudge truely.

Error of the shadow of the Mone

Wherefore I doe much commend the Equinoctiall Dyalls for the exacte truth, for they cannot know the truth by their Compasse, so that the Sunne or Mone or any other starre, haue any great declination being in Cancer: and you must consider this in lyke manner. The Sunne hauing North declination, the further you doe goe to the Northwardes, the longer is your daye, and the shorter is your night, and towardes the Southwarde, the shorter dayes and longer nights.

The equinoctiall dyalls be very good

Now contrarywyse, the Sunne hauing South declination, the more to the Northwardes, the shorter dayes, and the longer nights, the further to the Southwardes, the longer dayes and shorter nightes, and vnder the Equinoctial, the nights and dayes all one, what declination soeuer the Sunne hath: but this rule that I haue giuen you, is for London, or any other place that hath that Latitude or eleuation of the Pole Artick at 51. or. 52. degrees.

As touching the length & shortnesse of the day and night

¶ The fifth Chapter is of a table of declination commonly called of Seafaring men, a Regiment of the Sunne, exactly calculated for foure yeares, & wil ſerue for 24. yeares, for euery day of the moneth.

AND in lyke manner as I haue ſayde ſomewhat of the Mones motion, ſo I dō think it conuenient for to ſay ſomewhat of the Sunnes motion, for that it is neceſſary for Seamen for to know the Sunnes place in ỹ Zodiack wherby that they may calculate or count the Sunnes declination truly, & as I haue ſhewed before, that the Sun doth paſſe thorow the Zodiack in. 365. dayes. 5. houres 55. minutes. 13. ſeconds, and hath thre motions as the Mone hath. In the point of auge is the Sunnes ſlowe motion, and then the Sunne paſſeth or goeth but lyttle more then. 57. minutes in. 24. houres, and in the oppoſition of auge the Sunne paſſeth or goeth one degree and neare two minutes in. xxiiij. houres, that is more by nearer fiue minutes in hir ſwift motion then in the ſunnes ſlow motion. The point of Auge is now in this age of the world in the ſigne of Cancer, but not in the Solſtitiall point, when that the Sunne hath his greateſt declination, and alſo the oppoſition of Auge is in Capricorne, but not when the Sunne hath his greateſt declination. Now by the meanes of the thre motions of the Sunne, it cauſeth this that the Equinoctiall pointes be not euen, for that there is more dayes from the equinoctiall of March vnto ỹ equinoctiall of September by neare nine dayes, then that there is from the

Equi-

Equinoctiall of September vnto the Equinoctiall of March, for that there is from the eleuenth day of March vnto the. 14. daye of September. 187. dayes, and there is but. 178. dayes from the. 14. daye of September vnto the. 11. daye of March. And the reason is this as I haue sayde before, that the latter part of June that the Sun is in his slowe motion, and also in the latter part of December the Sunne is in his swifte motion: and this I doe thinke sufficient for instructions in this matter, for that the seamen hath no farther to doe with the Sunnes motion, but onely from the true place of the Sunne to seeke the true declination of it. And also the most part of seamen haue vsed Spanish Regimēts, and thinking that those would haue serued for euer, which is most contrary, for if that it be neuer so truely calculated, yet it groweth after. 24. yeare vnto errour. For as often as euery yeare of Bissextilis doeth come about, which is euery foure yeare, the Sunne is rather vppon the Equinoctiall by more then halfe an houre. &c.

Now shall follow a table of declination or Regiment for foure yeares, being calculated for Englande, and will serue all Europe without much errour, or any other country or place that hath our Longitude, as the most part of Africa, as Ginnie, and those parts to the Southwards, as farre as the Antarticke Pole, seruing for euery day of the month, very necessary for them that doe vse to trauell either by sea or by lande, and is one of the principall pointes in Nauigation, for long voyages, and the cause why I haue written this Regiment for the Sea, or tables of declination, is for that I doe know that euery person that goeth vnto the sea, as Master of a shippe, hath not capacitie to calculate the Sunnes declination, by the place of the sunne, although they haue the tables of Declination, as the

Euery person cānot calculate the Suns declinatiō

Ephemerides, or Martin Curtise, otherwise called the Art of Nauigation. Wherefore I haue written these notes, and Regiment or table of declination for foure yeares, and the first row towardes your left hande, is the dayes of the moneth: the nert rowe is the degrées of declination that the Sunne hath at the instant time of none: and the third rowe is the odde minutes of declination belonging to the degrées.

Tvvo tymes in the yeare the Sun hath no declinatiõ 1577.

Now ther be two times in ỳ yeare ỳ the Sun hath no declination, as this. For ỳ first yeare after Bissextilis, (which was in the yeare of our Lorde. 1577. the. 11. day of March, at foure of the clocke in the morning) the Sunne was vppon the Equinoctiall beginning North declination. And in like manner the. 13. day of September at none, the Sunne was vpon the Equinoctial beginning South declination, and also the second yeare after Bissextilis, which is the yeare of our Lorde. 1578. the Sunne is vpon the Equinoctial the. 11. day of March betwéene. 10. and. 11. of the clocke before none, beginning North declination: and in like manner the. 13. day of September, at. 6. of the clocke in the after none, beginning South declination.

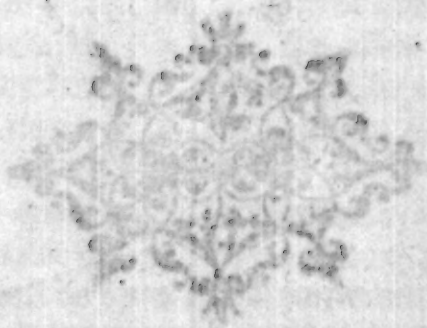
Furthermore, in the third yeare after Bissextilis, which is the yeare of our Lord. 1579. the Sunne is vpon the Equinoctiall the. 11. daye of March, betwéene foure and fiue of the clocke in the after none, beginning North declination, and so in like manner the. 13. day of September, at. 12. of the clocke at midnight, beginning South declination.

Lastly, in the yeare of our Lorde. 1580. that is the yeare Bissextilis, it selfe. Vpon the. 10. daye of March the Sunne shall be vpon the Equinoctiall betwéene. 10. and. 11. of the clocke at night, beginning North declination: and in lyke manner the. 13. daye of September, at fyre of the clocke in the morning, beginning South

declina-

declination: Now these foure yeares being expired, you must after the yeare Bissextilis, beginne againe at the yeare one: as here doth follow, for example. And so it will serue for neare. 20. yeares to come.

Yeare 1	Yeare 2	Yeare 3	Yeare Bissextilis
1577	1578	1579	1580
1581	1582	1583	1584
1585	1586	1587	1588
1589	1590	1591	1592
1593	1594	1595	1596



South declination.

Equinoctiall.

North declination.

January.			February.			March.		
D.	G.	M.	D.	G.	M.	D.	G.	M.
1	21	52	1	14	7	1	3	49
2	21	43	2	13	47	2	3	26
3	21	33	3	13	26	3	3	2
4	21	23	4	13	6	4	2	38
5	21	12	5	12	46	5	2	14
6	21	1	6	12	26	6	1	51
7	20	49	7	12	5	7	1	27
8	20	37	8	11	44	8	1	3
9	20	25	9	11	22	9	0	3
10	20	12	10	11	1	10	0	16
11	19	59	11	10	39	11	0	8
12	19	46	12	10	18	12	0	32
13	19	32	13	9	56	13	0	55
14	19	17	14	9	33	14	1	19
15	19	3	15	9	11	15	1	42
16	18	47	16	8	49	16	2	6
17	18	32	17	8	26	17	2	29
18	18	17	18	8	4	18	2	53
19	18	1	19	7	41	19	3	17
20	17	45	20	7	19	20	3	40
21	17	28	21	6	56	21	4	3
22	17	11	22	6	33	22	4	26
23	16	54	23	6	10	23	4	49
24	16	37	24	5	46	24	5	12
25	16	19	25	5	23	25	5	35
26	16	1	26	5	0	26	5	58
27	15	42	27	4	36	27	6	21
28	15	23	28	4	13	28	6	44
29	15	5				29	7	6
30	14	46				30	7	28
31	14	26				31	7	0

North declination.

Aprill. D.	G.	M.	May. D.	G.	M.	Solstic.	Iune. D.	G.	M.
1	8	13	1	17	49		1	23	8
2	8	35	2	18	5		2	23	13
3	8	57	3	18	20		3	23	15
4	9	19	4	18	35		4	23	18
5	9	41	5	18	49		5	23	22
6	10	2	6	19	4		6	23	24
7	10	23	7	19	17		7	23	26
8	10	44	8	19	31		8	23	27
9	11	6	9	19	44		9	23	27
10	11	25	10	19	57		10	23	28
11	11	45	11	20	8		11	23	28
12	12	6	12	20	21		12	23	28
13	12	26	13	20	33		13	23	28
14	12	47	14	20	45		14	23	27
15	13	6	15	20	56		15	23	26
16	13	26	16	21	6		16	23	25
17	13	45	17	21	17		17	23	24
18	14	4	18	21	27		18	23	22
19	14	23	19	21	37		19	23	19
20	14	41	20	21	46		20	23	15
21	15	0	21	21	55		21	23	12
22	15	18	22	22	3		22	23	8
23	15	35	23	22	12		23	23	3
24	15	53	24	22	19		24	22	59
25	16	11	25	22	27		25	22	54
26	16	29	26	22	33		26	22	48
27	16	45	27	22	40		27	22	42
28	17	2	28	22	47		28	22	35
29	17	18	29	22	52		29	22	29
30	17	34	30	22	57		30	22	22
			31	23	3				

North declination.

Iuly.

July.			August.			September		
D.	G.	M.	D.	G.	M.	D.	G.	M.
1	22	13	1	15	23	1	4	39
2	22	5	2	15	5	2	4	16
3	21	56	3	14	48	3	3	53
4	21	47	4	14	30	4	3	31
5	21	36	5	14	11	5	3	7
6	21	27	6	13	51	6	2	44
7	21	19	7	13	33	7	2	20
8	21	8	8	13	13	8	1	58
9	20	57	9	12	54	9	1	34
10	20	47	10	12	34	10	1	10
11	20	35	11	12	14	11	0	48
12	20	24	12	11	53	12	0	24
13	20	12	13	11	33	13	0	0
14	19	59	14	11	14	14	0	24
15	19	46	15	10	54	15	0	47
16	19	33	16	10	32	16	1	11
17	19	19	17	10	12	17	1	34
18	19	5	18	9	50	18	1	58
19	18	56	19	9	28	19	2	21
20	18	37	20	9	7	20	2	44
21	18	22	21	8	46	21	3	8
22	18	9	22	8	24	22	3	32
23	17	53	23	8	2	23	3	55
24	17	37	24	7	39	24	4	18
25	17	22	25	7	18	25	4	41
26	17	5	26	6	55	26	5	3
27	16	49	27	6	33	27	5	27
28	16	22	28	6	11	28	5	50
29	16	7	29	5	47	29	6	13
30	15	59	30	5	25	30	6	36
31	15	41	31	5	2			

North declination.

Equinoctiall.

North declination.

South declination.

October.			Nouember.			December.		
D.	G.	M.	D.	G.	M.	D.	G.	M.
1	6	59	1	17	26	1	23	3
2	7	22	2	17	43	2	23	8
3	7	44	3	17	59	3	23	12
4	8	6	4	18	15	4	23	15
5	8	39	5	18	31	5	23	19
6	8	51	6	18	46	6	23	22
7	9	13	7	19	1	7	23	24
8	9	34	8	19	16	8	23	25
9	9	56	9	19	30	9	23	26
10	10	18	10	19	44	10	23	27
11	10	40	11	19	58	11	23	28
12	11	1	12	20	10	12	23	28
13	11	23	13	20	22	13	23	28
14	11	44	14	20	36	14	23	27
15	12	5	15	20	48	15	23	26
16	12	26	16	20	59	16	23	25
17	12	47	17	21	10	17	23	24
18	13	7	18	21	21	18	23	21
19	13	27	19	21	33	19	23	18
20	13	47	20	21	41	20	23	14
21	14	7	21	21	51	21	23	11
22	14	26	22	21	59	22	23	6
23	14	45	23	22	8	23	23	1
24	15	4	24	22	17	24	22	55
25	15	23	25	22	25	25	22	50
26	15	41	26	22	32	26	22	43
27	16	0	27	22	39	27	22	36
28	16	17	28	22	46	28	22	28
29	16	35	29	22	52	29	22	21
30	16	52	30	22	57	30	22	13
31	17	9				31	22	4

South declination.

South declination.

Solstic.

Ianuary

Iannuary.			February.			March.		
D.	G.	M.	D.	G.	M.	D.	G.	M.
1	21	56	1	14	12	1	3	55
2	21	46	2	13	52	2	3	32
3	21	36	3	13	32	3	3	8
4	21	26	4	13	11	4	2	44
5	21	15	5	12	51	5	2	20
6	21	4	6	12	31	6	1	57
7	20	52	7	12	10	7	1	34
8	20	41	8	11	49	8	1	10
9	20	28	9	11	27	9	0	46
10	20	16	10	11	6	10	0	22
11	20	3	11	10	44	11	0	2
12	19	49	12	10	23	12	0	25
13	19	36	13	10	1	13	0	49
14	19	21	14	9	39	14	1	13
15	19	7	15	9	17	15	1	36
16	18	52	16	8	55	16	2	0
17	18	37	17	8	32	17	2	23
18	18	17	18	8	10	18	2	47
19	18	1	19	7	47	19	3	11
20	17	49	20	7	25	20	3	34
21	17	32	21	7	2	21	3	56
22	17	15	22	6	39	22	4	20
23	16	57	23	6	16	23	4	43
24	16	40	24	5	52	24	5	7
25	16	23	25	5	29	25	5	29
26	16	5	26	5	6	26	5	52
27	15	47	27	4	42	27	6	16
28	15	28	28	4	19	28	6	38
29	15	10				29	7	1
30	14	51				30	7	23
31	14	31				31	7	46

South declination.

South declination.

Equino-

ctiall.

North declination.

Aprill.			May.			Iune.		
D.	G.	M.	D.	G.	M.	D.	G.	M.
1	8	9	1	17	46	1	23	6
2	8	30	2	18	1	2	23	11
3	8	51	3	18	17	3	23	14
4	9	14	4	18	32	4	23	17
5	9	35	5	18	46	5	23	20
6	9	56	6	19	1	6	23	23
7	10	18	7	19	14	7	23	25
8	10	39	8	19	28	8	23	26
9	10	59	9	19	41	9	23	27
10	11	20	10	19	54	10	23	27
11	11	41	11	20	6	11	23	28
12	12	1	12	20	18	12	23	28
13	12	21	13	20	30	13	23	28
14	12	41	14	20	41	14	23	27
15	13	1	15	20	53	15	23	26
16	13	21	16	21	3	16	23	25
17	13	40	17	21	14	17	23	24
18	14	0	18	21	25	18	23	22
19	14	18	19	21	34	19	23	20
20	14	37	20	21	43	20	23	16
21	14	55	21	21	52	21	23	12
22	15	13	22	22	1	22	23	9
23	15	30	23	22	9	23	23	5
24	15	48	24	22	17	24	23	0
25	16	6	25	22	25	25	22	54
26	16	23	26	22	31	26	22	49
27	16	40	27	22	38	27	22	43
28	16	57	28	22	45	28	22	36
29	17	13	29	22	52	29	22	29
30	17	30	30	22	58	30	22	22
			31	23	1			

North declination.

North declination.

Solstic.

Iuly.

Iuly.			Auguſt.			September		
D.	G.	M.	D.	G.	M.	D.	G.	M.
1	22	14	1	15	28	1	4	45
2	22	6	2	15	10	2	4	22
3	21	58	3	14	51	3	3	58
4	21	49	4	14	33	4	3	36
5	21	40	5	14	16	5	3	13
6	21	31	6	13	58	6	2	49
7	21	21	7	13	38	7	2	26
8	21	11	8	13	18	8	2	4
9	21	0	9	12	58	9	1	42
10	20	49	10	12	39	10	1	18
11	20	38	11	12	19	11	0	56
12	20	26	12	11	59	12	0	32
13	20	13	13	11	39	13	0	7
14	20	2	14	11	19	14	0	17
15	19	55	15	10	58	15	0	41
16	19	37	16	10	36	16	1	3
17	19	23	17	10	16	17	1	27
18	19	9	18	9	54	18	1	51
19	18	55	19	9	34	19	2	15
20	18	42	20	9	12	20	2	38
21	18	26	21	8	50	21	3	1
22	18	12	22	8	28	22	3	24
23	17	56	23	8	7	23	3	48
24	17	41	24	7	45	24	4	11
25	17	25	25	7	24	25	4	34
26	17	9	26	7	2	26	4	57
27	16	52	27	6	39	27	5	20
28	16	36	28	6	16	28	5	44
29	16	20	29	5	53	29	6	7
30	16	2	30	5	31	30	6	30
31	15	45	31	5	8			

North declination.

North declination.

Equino-

ctiall.

South declination.

October.

October.			Nouember.			December.		
D.	G.	M.	D.	G.	M.	D.	G.	M.
1	6	53	1	17	22	1	23	2
2	7	16	2	17	39	2	23	7
3	7	39	3	17	55	3	23	12
4	8	0	4	18	1	4	23	15
5	8	23	5	18	27	5	23	18
6	8	45	6	18	42	6	23	22
7	9	8	7	18	57	7	23	25
8	9	30	8	19	11	8	23	26
9	9	52	9	19	25	9	23	26
10	10	13	10	19	39	10	23	27
11	10	35	11	19	53	11	23	28
12	10	56	12	20	6	12	23	28
13	11	18	13	20	19	13	23	28
14	11	39	14	20	32	14	23	27
15	12	0	15	20	44	15	23	26
16	12	21	16	20	56	16	23	25
17	12	42	17	21	6	17	23	24
18	13	2	18	21	17	18	23	22
19	13	22	19	21	28	19	23	19
20	13	42	20	21	38	20	23	15
21	14	2	21	21	48	21	23	12
22	14	22	22	21	57	22	23	8
23	14	41	23	22	6	23	23	2
24	15	0	24	22	15	24	22	56
25	15	19	25	22	23	25	22	51
26	15	37	26	22	31	26	22	45
27	15	56	27	22	37	27	22	37
28	16	14	28	22	44	28	22	30
29	16	31	29	22	51	29	22	23
30	16	48	30	22	57	30	22	15
31	17	5				31	22	7

South declination. Solstic. South declination.

January.			February.			March.		
D.	G.	M.	D.	G.	M.	D.	G.	M.
1	21	57	1	14	17	1	4	2
2	21	48	2	13	57	2	3	38
3	21	38	3	13	37	3	3	15
4	21	28	4	13	15	4	2	51
5	21	18	5	12	56	5	2	27
6	21	6	6	12	35	6	2	3
7	20	55	7	12	15	7	1	40
8	20	44	8	11	54	8	1	16
9	20	31	9	11	33	9	0	52
10	20	19	10	11	12	10	0	28
11	20	5	11	10	51	11	0	4
12	19	52	12	10	29	12	0	20
13	19	39	13	10	7	13	0	44
14	19	24	14	9	45	14	1	8
15	19	10	15	9	22	15	1	32
16	18	56	16	9	0	16	1	55
17	18	40	17	8	38	17	2	18
18	18	24	18	8	15	18	2	41
19	18	9	19	7	53	19	3	5
20	17	53	20	7	30	20	3	29
21	17	36	21	7	8	21	3	52
22	17	20	22	6	45	22	4	14
23	17	2	23	6	22	23	4	38
24	16	45	24	5	59	24	5	1
25	16	27	25	5	35	25	5	24
26	16	10	26	5	12	26	5	47
27	15	51	27	4	49	27	6	10
28	15	33	28	4	25	28	6	33
29	15	13				29	6	56
30	14	55				30	7	19
31	14	35				31	7	40

South declination.

South declination.

Equino-

ctiall.

North declination.

Aprill.				May.				Iune.		
D.	G.	M.		D.	G.	M.		D.	G.	M.
1	8	1	North declination.	1	17	43	Solstic. North declination.	1	23	5
2	8	24		2	17	59		2	23	10
3	8	46		3	18	14		3	23	13
4	9	8		4	18	28		4	23	16
5	9	30		5	18	42		5	23	20
6	9	52		6	18	57		6	23	23
7	10	12		7	19	11		7	23	24
8	10	34		8	19	24		8	23	25
9	10	57		9	19	38		9	23	26
10	11	16		10	19	51		10	23	27
11	11	36		11	20	3		11	23	28
12	11	56		12	20	15		12	23	28
13	12	17		13	20	28		13	23	28
14	12	37		14	20	39		14	23	27
15	12	57		15	20	51		15	23	26
16	13	16		16	21	1		16	23	25
17	13	35		17	21	12		17	23	24
18	13	54		18	21	22		18	23	22
19	14	14		19	21	32		19	23	20
20	14	32		20	21	42		20	23	17
21	14	51		21	21	51		21	23	13
22	15	10		22	22	0		22	23	10
23	15	27		23	22	8		23	23	6
24	15	46		24	22	16		24	23	1
25	16	4		25	22	24		25	22	55
26	16	22		26	22	30		26	22	50
27	16	38		27	22	37		27	22	44
28	16	54		28	22	43		28	22	37
29	17	10		29	22	50		29	22	31
30	17	27		30	22	55		30	22	24
				31	23	0				

July.			August.			September.		
D.	G.	M.	D.	G.	M.	D.	G.	M.
1	22	16	1	15	30	1	4	54
2	22	9	2	15	13	2	4	28
3	22	0	3	14	56	3	4	5
4	21	51	4	14	49	4	3	41
5	21	43	5	14	20	5	3	18
6	21	33	6	14	1	6	2	55
7	21	23	7	13	42	7	2	31
8	21	12	8	13	22	8	2	8
9	21	2	9	13	3	9	1	47
10	20	52	10	12	43	10	1	23
11	20	42	11	12	23	11	0	59
12	20	30	12	12	2	12	0	36
13	20	18	13	11	42	13	0	12
14	20	6	14	11	23	14	0	12
15	19	57	15	11	2	15	0	36
16	19	40	16	10	41	16	0	59
17	19	26	17	10	20	17	1	23
18	19	13	18	9	58	18	1	47
19	19	0	19	9	38	19	2	10
20	18	45	20	9	17	20	2	33
21	18	30	21	8	56	21	2	56
22	18	15	22	8	33	22	3	20
23	18	0	23	8	12	23	3	43
24	17	45	24	7	50	24	4	6
25	17	29	25	7	28	25	4	30
26	17	14	26	7	5	26	4	52
27	16	57	27	6	43	27	5	16
28	16	40	28	6	20	28	5	39
29	16	24	29	5	58	29	6	2
30	16	6	30	5	35	30	6	25
31	15	49	31	5	14			

North declination.

Equino-ctiall.

North declination.

South declination.

October.				November.				December.		
D.	G.	M.		D.	G.	M.		D.	G.	M.
1	6	48		1	17	16		1	23	0
2	7	10		2	17	33		2	23	6
3	7	34		3	17	49		3	23	11
4	7	55		4	18	5		4	23	15
5	8	18		5	18	22		5	23	18
6	8	40		6	18	37		6	23	21
7	9	3		7	18	52		7	23	24
8	9	25		8	19	7		8	23	26
9	9	46		9	19	21		9	23	27
10	10	8		10	19	35	Solstic.	10	23	27
11	10	30		11	19	49		11	23	28
12	10	53		12	20	2		12	23	28
13	11	13		13	20	15		13	23	28
14	11	33		14	20	28		14	23	27
15	11	54		15	20	40		15	23	27
16	12	15		16	20	53		16	23	26
17	12	34		17	21	4		17	23	25
18	12	56		18	21	15		18	23	23
19	13	16		19	21	26		19	23	21
20	13	36		20	21	36		20	23	16
21	13	56		21	21	45		21	23	12
22	14	16		22	21	54		22	23	8
23	14	35		23	22	3		23	23	3
24	14	57		24	22	12		24	22	57
25	15	12		25	22	20		25	22	52
26	15	30		26	22	28		26	22	46
27	15	49		27	22	35		27	22	39
28	16	7		28	22	42		28	22	32
29	16	25		29	22	49		29	22	25
30	16	42		30	22	55		30	22	17
31	16	59						31	22	8

South declination. South declination.

January.			February.			March.		
D.	G.	M.	D.	G.	M.	D.	G.	M.
1	21	59	1	14	21	1	3	44
2	21	50	2	14	2	2	3	21
3	21	41	3	13	42	3	2	57
4	21	31	4	13	22	4	2	33
5	21	20	5	13	2	5	2	9
6	21	9	6	12	41	6	1	46
7	20	58	7	12	21	7	1	22
8	20	47	8	12	0	8	0	58
9	20	34	9	11	39	9	0	34
10	20	22	10	11	18	10	0	10
11	20	9	11	10	57	11	0	14
12	19	56	12	10	35	12	0	38
13	19	43	13	10	13	13	1	0
14	19	28	14	9	51	14	1	24
15	19	13	15	9	28	15	1	48
16	18	59	16	9	6	16	2	12
17	18	44	17	8	44	17	2	35
18	18	29	18	8	21	18	2	59
19	18	14	19	7	59	19	3	22
20	17	57	20	7	36	20	3	46
21	17	41	21	7	14	21	4	9
22	17	25	22	6	51	22	4	32
23	17	7	23	6	28	23	4	55
24	16	50	24	6	5	24	5	19
25	16	32	25	5	41	25	5	41
26	16	14	26	5	18	26	6	3
27	15	56	27	4	55	27	6	27
28	15	38	28	4	3	28	6	50
29	15	18	29	4	8	29	7	13
30	15	0				30	7	35
31	14	41				31	7	57

South declination.

South declination.

Equino-

diall.

North declination.

Aprill.

Aprill.			May.			Iune.		
D.	G.	M.	D.	G.	M.	D.	G.	M.
1	8	20	1	17	54	1	23	8
2	8	41	2	18	9	2	23	12
3	9	3	3	18	24	3	23	15
4	9	25	4	18	38	4	23	19
5	9	46	5	18	53	5	23	22
6	10	8	6	19	7	6	23	24
7	10	29	7	19	21	7	23	25
8	10	50	8	19	34	8	23	26
9	11	11	9	19	48	9	23	27
10	11	31	10	20	0	10	23	28
11	11	51	11	20	12	11	23	28
12	12	12	12	20	25	12	23	28
13	12	33	13	20	37	13	23	27
14	12	52	14	20	48	14	23	27
15	13	12	15	20	58	15	23	26
16	13	32	16	21	9	16	23	25
17	13	51	17	21	20	17	23	24
18	14	11	18	21	30	18	23	21
19	14	29	19	21	39	19	23	18
20	14	47	20	21	48	20	23	14
21	15	5	21	21	57	21	23	11
22	15	24	22	22	5	22	23	7
23	15	41	23	22	14	23	23	2
24	16	0	24	22	22	24	22	56
25	16	18	25	22	29	25	22	51
26	16	34	26	22	35	26	22	46
27	16	50	27	22	41	27	22	39
28	17	6	28	22	48	28	22	32
29	17	22	29	22	54	29	22	26
30	17	39	30	22	58	30	22	18
			31	23	3			

North declination.

North declination.

Solstic.

July.			August.			September		
D.	G.	M.	D.	G.	M.	D.	G.	M.
1	22	10	1	15	17	1	4	33
2	22	2	2	15	0	2	4	10
3	21	53	3	14	42	3	3	47
4	21	45	4	14	23	4	3	24
5	21	36	5	14	5	5	3	0
6	21	26	6	13	46	6	2	37
7	21	16	7	13	26	7	2	13
8	21	6	8	13	7	8	1	52
9	20	55	9	12	48	9	1	28
10	20	44	10	12	28	10	1	4
11	20	32	11	12	8	11	0	41
12	20	21	12	11	47	12	0	18
13	20	9	13	11	28	13	0	6
14	19	56	14	11	7	14	0	30
15	19	43	15	10	46	15	0	53
16	19	30	16	10	26	16	1	17
17	19	16	17	10	4	17	1	40
18	19	2	18	9	43	18	2	4
19	18	48	19	9	21	19	2	26
20	18	34	20	8	59	20	2	50
21	18	19	21	8	37	21	3	13
22	18	4	22	8	16	22	3	37
23	17	48	23	7	56	23	4	0
24	17	33	24	7	33	24	4	23
25	17	19	25	7	11	25	4	46
26	17	2	26	6	49	26	5	9
27	16	45	27	6	26	27	5	32
28	16	28	28	6	3	28	5	55
29	16	11	29	5	40	29	6	19
30	15	53	30	5	19	30	6	42
31	15	36	31	4	57			

North declination.

North declination.

Equino-

ctiall.

South declination.

October.

October.			Nouember.			December.		
D.	G.	M.	D.	G.	M.	D.	G.	M.
1	7	5	1	17	31	1	23	5
2	7	27	2	17	47	2	23	10
3	7	49	3	18	3	3	23	13
4	8	12	4	18	19	4	23	16
5	8	34	5	18	34	5	23	20
6	8	56	6	18	49	6	23	23
7	9	18	7	19	4	7	23	25
8	9	46	8	19	18	8	23	26
9	10	2	9	19	32	9	23	27
10	10	24	10	19	46	10	23	27
11	10	45	11	20	0	11	23	28
12	11	7	12	20	13	12	23	28
13	11	28	13	20	26	13	23	28
14	11	49	14	20	37	14	23	27
15	12	10	15	20	50	15	23	26
16	12	31	16	21	1	16	23	25
17	12	51	17	21	12	17	23	24
18	13	11	18	21	23	18	23	21
19	13	31	19	21	33	19	23	18
20	13	51	20	21	43	20	23	13
21	14	11	21	21	52	21	23	9
22	14	30	22	22	1	22	23	6
23	14	50	23	22	11	23	23	0
24	15	9	24	22	19	24	22	54
25	15	27	25	22	27	25	22	49
26	15	46	26	22	34	26	22	43
27	16	4	27	22	41	27	22	35
28	16	22	28	22	48	28	22	28
29	16	39	29	22	54	29	22	21
30	16	56	30	22	59	30	22	13
31	17	14				31	22	4

South declination.

Solstic.

South declination.

The

¶ The sixt Chapter sheweth how to take the height of the Sunne with the crosse staffe, or with the Astrolobe, and also how to finde the true Meridian, with other necessary matters.

TO take the true height of ẏ Sunne at the Sea, the best way is, to doe it with the Crosse staffe: for that the Sea is moueable, & causeth the ship to heaue, and set little or much: And also vpon the crosse staffe the degrées be larger marked than the Ring or Astrolobe: and in a large instrument an errour is séene sooner and better than it is in a small instrument.

Now to take the height of the Sunne, to know the Altitude of the Pole aboue the Horizon, doe this: First set the Sunne with the Compasse, to know when ẏ the Sunne commeth neare vnto the Meridian: as soone as you sée that the Sunne is come vnto the South and by East, thẽ beginne to take the height of the Sunne with the crosse staffe, in this manner: Put ẏ Transuastorie vpon the long staffe, then set the ende of the long staffe close at ẏ corner of your eye, winking with your other eye, & remouing the Transuastorie forwards or backwards, vntil you doe sée the lower ende of it (being iust with the Horizon) and the vpper ende of it, (being iust with the middle of the Sunne) both to agrée with the Sunne and the Horizon at one time: and so haue you the true height of the Sunne: this done, still obserue the same, vntil you sée the Sun at the highest, & beginning to discend, and then haue you finished. Yet notwithstãding this is to be noted: that it is best to take the height of the Sun with the Crosse staffe, when the Sunne is

Howv to obserue ẏ Sunne.

To take ẏ height of ẏ Sun vvith the Crosse staffe.

The cause vvhy the Crosse staffe is

best to take the height of the Sun vnto 50. degrees.

vnder fifty degrées in height aboue the Horizon, for two causes. The one is this: Till the Sunne be fiftie degrées in height, the degrées be largely marked vpon the Crosse staffe, but after (the Sunne being aboue. 50. degrées high) they be lesser marked then the other is, for that the Sunne being vnder. 50. degrées in height, you may easily take the height, because you may easily sée or viewe the vpper ende and the nether ende of the crosse staffe both at one time: but if it doth excéede. 50. degrées, then by the meanes of casting your eye vpwardes and downewards so much, you may sone commit errour, & then in like manner, the degrées be so smal marked, ỳ if ỳ Sun doth passe. 50. or. 60. degrées in height, you must leaue the Crosse staffe, & vse the Mariners Ring, called by them the Astrolaby or Astrolobe.

To take ỳ height of the sun vvith the astrolobe Hovv to correcte your Astrolobe if it doth not hang vp right

Now to take the height of the Sunne with the common Ring or Astrolobe, doe thus: The Sunne being (as before is declared) neare the Meridian or South, obserue it (vntil you haue the greatest height thereoff) in this manner: Holde the Ring of the Astrolobe vpon one of your fingers, and turn the Athelyday vp & down, vntill you sée the shadow of the Sunne pearse or passe through both the sights thereoff, being sure ỳ the Astrolobe doth hang vpright, which you may prowe in this manner.

Loke at how many degrées, and minutes the Athelyday doeth stande vpon the Astrolobe, then turne the Atheliday vnto the same number of the degrées and minutes on the other side of the Astrolobe, & then taking the height of the Sunne againe, if it doe agrée as it did before, then the Astrolobe doth hang vpright: but if it do not, then it doth not hang vpright. For knowledge of the true height of the Sunne (the Astrolobe not hanging vpright) doe thus: if the Astrolobe be truely marked, marke the diuersitie, ỳ being knowne, rebate from

the

the greatest height half the diuersitie, or else ad vnto the lesser height, halfe the diuersitie, & that shall be the true height of the Sunne, although that the Astrolobe doth not hang vpright.

The Astrolobe is best to take the height of the Sun, if the Sunne be very high at. 60. 70. or. 80. degrees: and the cause is this: the Sunne comming neare vnto your Zenith, hath great power of light, for to pearce the two sights of the Atheliday of the Astrolobe, and then it is not good to vse the Crosse staffe, for that the Sunne hurteth the eyes of a man, and besides that it is to high to occupy the Crosse staffe, (as before is declared) so that this way you may very much preserue your eyes. If you haue not glasses vpon your staffe (to saue your eies in taking the height of the Sunne) but be vnprouided of them, doe thus: take and couer the Sunne with the ende of the transuastory of the crosse staffe, vnto the very vpper edge or brinke of the Sunne (so shall you not nede to beholde the brightnesse of it) and with the other ende of the Transuastory to take the Horizon truely, & that being done, for that the Sunne is. 30. or. 31. minuts in Diameter or bredth, therefore you shall rebate. 15. minutes from the altitude or height of the Sunne, and then that which shall remayne, shall be the true height of the Sunne, from the center or middle of the Sun. And furthermore, there is some errour in the taking the Sunne or Starre with the Ballastel or Crosse staffe, and that groweth by this meanes: for that the true center (which is the sight of the eye) is within, in the myddle of the eye, and not in the outsyde of the eye: so that the ende of the long staffe in the setting of it vnto the corner of your eye, doth stande somewhat further out thā the sight of your eye, that is to say, that the sight of the eye is somewhat further into the head, than the ende of the staffe doth come: wherefore you

The Astrolobe is best to take the height of the Sunne at 60. 70. or. 80. degrees in height.

Howv to preserue your eyes vvhē you touch the Sun vvith the crosse staffe, and haue no glasses.

The Diameter of the Sun is. 30. or 31. minutes.

Some error in the crosse staf and hovv to reform it.

must pare away a little of the ende of ỹ staffe, for some mens vses more, and some mens vses lesse, for that it is according as you may set the staffe vnto your eye, for some men nede pare away little or nothing, and some men must pare away. 14. or. 15. minutes, as you may set the staffe: bicause some mens eyes be further into their head, than other some mens are, and the bones of some mens face stand further out than other some doe. It is moreouer conuenient to knowe the true Meridian, or South, which you must doe, either with a good compasse, or with a perfect Diall or Nedel: but if you be on the land, this you may doe: on a pece of timber, or any other thing that standeth fast, with a payre of compasses make a circle, then in the middle or center where the fote of the compasse did stand, sette a wyre vpright (as circumspectly as you can) & then you may doe this: loke in the morning (so it be on plain groũd, that you may see the Horizon circle, without any lette at the Sunne rysing, for the shadow of the wyre, & there set a pricke: then at the setting of the Sunne you shall set another prick, euen at the circumference of the circle, thẽ diuide that with your compasses euen in. 2. peces, and strike a straight line from the wyre or center of the circle, to the middle or diuided prick, and that shall be ỹ true meridian. Or else the (wyre standing vpright) first in the forenone when the toppe of the wyre doth touch, or is ready to come into the circũference or edge of the circle, there make a prick: then in the after none in like manner at the very comming out or touching of the wyre, of the edge of the circle, ther make an other pricke euen with the comming out of the shadow: this done (as circũspectly as you can) diuide these. 2. prickes in the middle, then as before is sayde, drawe a line frõ the center or wyre to the middle pricke, and that shadow shall be your true Meridian. After an other man-

To get the true Meridian vpon the land.

ner

ner you may do this: loke and watch when the wyre giueth the shortest shadow, and there make a prick, then draw a line from that prick to the wyre, which shadow shall be the true Meridian.

To know the true meridian at the Sea and also (if your compasse be varied) and to know howe muche they be varyed.

And yet furthermore, for that it is most conuenient to know the true Meridian at the sea, bicause in long voiages going farre vnto the Westward or Eastward, the compasse doth vary: to finde the true Meridian doe this. Set the Sunne with your compasse at hir rising or appearing aboue the Horizon, & then (knowing what point and part the Sunne doth ryse at) set the Sunne with your compasse at hir setting or departing vnder the Horizon, and (that being knowne) you shall perfectly know, whether the compasse be varyed, and how much: for ensample this, I doe set the Sunne at hir rising with the compasse, and she doth rise vpon the East point: in like manner also I doe set the Sunne with the compasse at hir setting, & doe finde hir to set West Northwest: so I doe see the compasse to be varyed one point, that is to say, the North point doth stand North and by East. &c. And furthermore (for ỹ seldome times the Sunne doth ryse and set clere by the meanes of the cloudes, and other impediments nere the Horizon) you may get the true Meridian thus: at any time in ỹ forenoone, first set the Sunne with your compasse, and then take the true height of the Sunne. Now you (knowing how many degrees the Sunne was high at that point of the compasse) you may in lyke manner obserue the Sunne in the afternoone, vntill you doe finde the Sun iust at that height that it was in the forenoone, marking at what point of the compasse the Sunne is, and so shal you see perfectly whether the compasse be varyed or no, and also how much: for ensample thus: I take the Sun vpon the Southeast point. 20. degrees aboue the Horizon, and then in the afternoone I do obserue the Sunne

vntill such tyme as I doe finde the Sunne iust.20. degrées aboue the Horizon againe, and then I set the Sun with the compasse, and doe finde the Sunne to be at.20 degrées in height West Southwest, so that I sée the compasse to be varyed one point, that is to say, ỹ North point doth stand North and by East.&c.

Another way also to know the true Meridian by the Sunne: that is, to set the Sunne with the compasse at hir greatest height aboue the Horizon, and so you shall know whether the compasse be varyed, and how much: and loke what is spoken of the Sunne by day, you may doe the lyke by night by any of the starres that you perfectly doe know, doing as you doe by the Sunne in all points: but you cannot doe it so well and truely by the Mone, by the meanes of the swiftnesse of the Mones motion in the Zodiack, you may also finde the variation of the compasse, by the North starre, as thus: set the North starre with the compasse, if the North point doe stand right with the starre, then it is not varyed, but if it doth not stande right with the starre, then it is varyed: and that must be done when the two starres of Charles wayne called the pointers, be right vnder or right ouer the North starre, but if that the starres be west from the North starre, thē the North starre is the third part of a point vnto the Eastward of the North Pole. If the two starres of Charles wayne, called the pointers, be due East from the North starre, then the North starre is the third part of a point vnto the westward of the North Pole.&c.

To finde the variatiō of the compasse in ỹ night by ỹ stars but not by the Moone

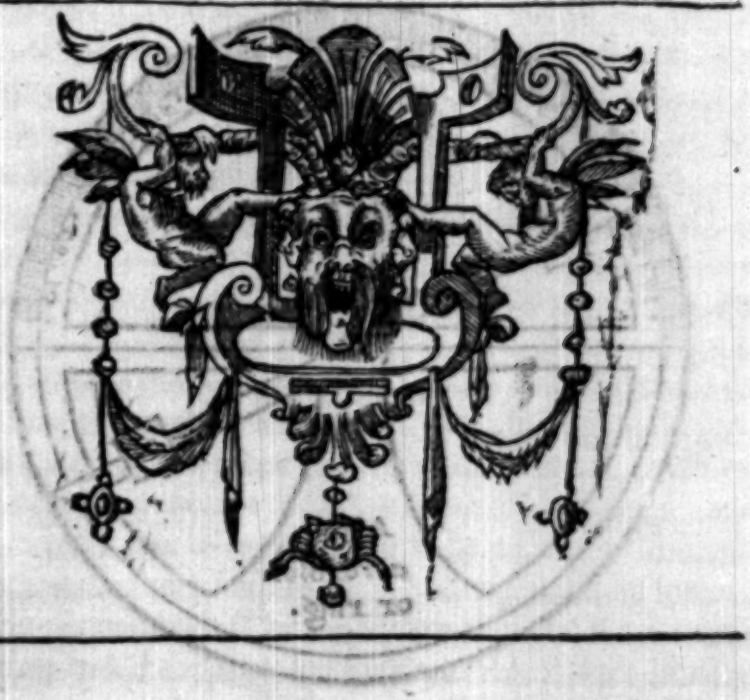
This haue I sayd, bicause that sometime in sundry places, the compasse doth vary, & especially in the sayling of long voiages running East and West, (called the Northeasting or Northwesting of the Compasse) therefore I would not wish them to meddle with the mēding of their compasse, or whetting of the side of the nēedle,

Meddel not vvith your compasse al-

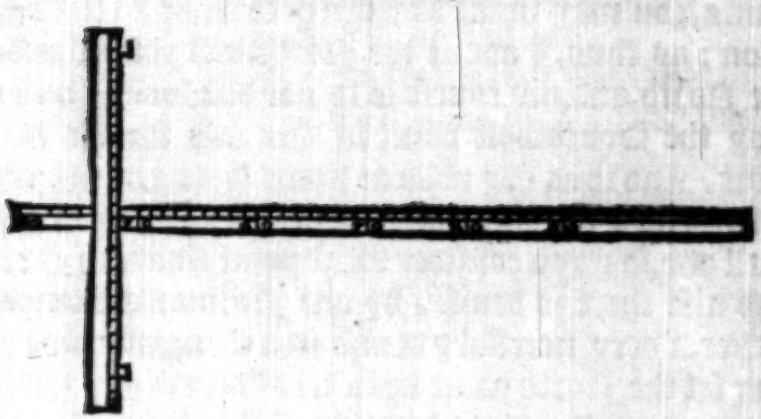
néedle, to the ende to make it ſtand due North, but circumſpectly to awayte the altering of the Compaſſe, and what quantitie it doth alter: as you may doe very wel by the order before rehearſed, and then let your Compaſſe alone: for although that it doth vary two or three points, you may make account according to the varyation: as thus, I admit the Northweſt point ſtandeth due North, and my courſe is to goe due weſt, I will occupy the Southweſt point in this caſe for the Weſt point. And thus (by obſeruation & trying of my compaſſe) I care not what point ſtandeth due North, for it is all one, ſo ỹ you conſider what point ſtandeth North. And alſo there is deuiſed by one Norman a Compaſſe maker, a very neceſſary deuiſe in a Compaſſe, that you may ſet the North point vpon what degrée you lyſt, according vnto the true variation of the Compaſſe at all tymes at your pleaſure.

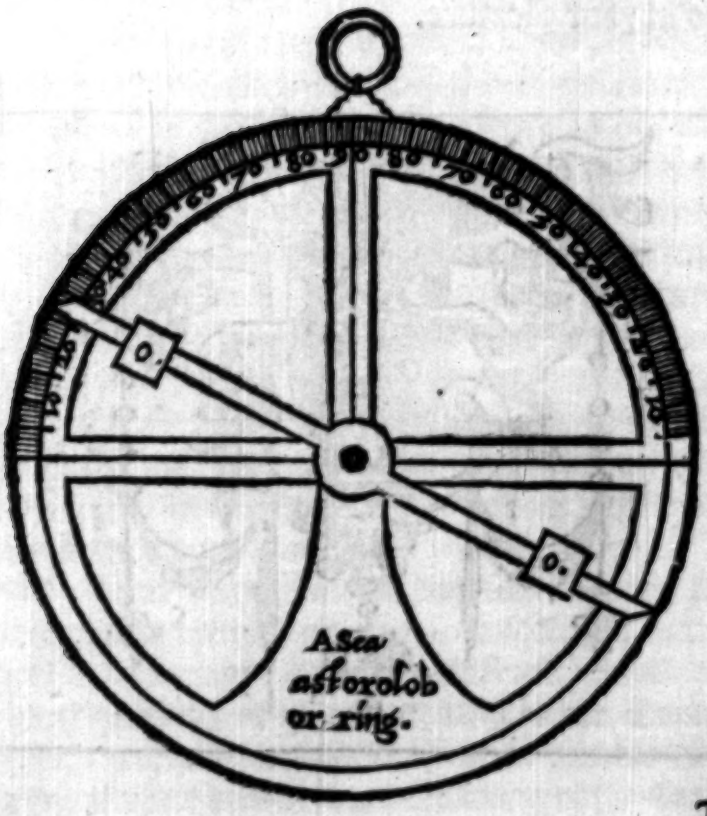
though it be varied.

To ſaile by the cõpaſſe that is varied.



¶ The Balla Stella, or Croſſe ſtaffe: to take the height of the Sunne or Starre.





The

¶ The. vij. Chapter ſheweth how to handle the declinatiō of the Sunne to know the altitude of the North Pole aboue the Horizon, (the height of the Sunne being truely takē & knowen in any place betwen the North Pole and the Equinoctial) ſo that the Sunne be vnto the Southwards of you, at the taking of the Sunne vpon the Meridian,

YOV muſt conſider by the Regiment or table of declination (going before) ẏ the.11.day of March the Sunne is Equinoctiall, entring then the firſt point of Aries, (called the equinoctiall of ſpring tyme) where ſhe hath no declination. The.10.day of Aprill the Sunne entreth into the firſt minute of Taurus, then hauing declination to the Northwards.11.degrées.30.minutes. The.12.day of May, the Sunne entereth the firſt point of Gemini, hauing then declination.20.degrées.12 minutes. The.12. day of June the Sunne entreth into Cancer, where he (making his greateſt progreſſe to the Northwards) hath.23.degrées.28.minutes of declination. But now in this our tyme, ſome doe affirme it to be.23. degrées and a halfe, but it lacketh two minutes. The.14.day of July, the Sunne entreth into Leo, comming downwardes to the Equinoctiall, hauing.20.degrées.12.minutes of declination. The.14.day of Auguſt the Sunne entreth into Virgo, hauing declination.11. degrées.30.minutes. The.14.of September, the Sunne entreth into Libra, (then being Equinoctial, and hauing

The greateſt declination of the Sun.

Equinoctial of Autumne.

no declination) which is called the Equinoctiall of Autumne or harueſt, where he beginneth his South declinatiõ. The.14.of October the Sunne entreth into Scorpio, where his declination is.11. degrées.30.minutes. The.12.of Nouember the Sunne entreth into Sagittarius, his declination being.20.degrées.12.minutes. The 12.day of December, the Sun entreth the firſt minute of Capricorne, where the Sunne (making the greateſt progreſſe to the Southwards) hath of declination.23. degrées and.28.minutes. From whence he returneth to the equinoctiall againe. The.11.of Januarye the Sunne entreth into Aquarius, where his declination is.20.degrées.12.minutes. The.10.day of Febꝛuary the Sunne entreth into the firſt minute of Piſces, and hath of declination.11.degrées.30.minutes. The.11.day of March, the Sunne retourneth to the ſelfe ſame place that it departed from beforꝛe, wherefoꝛe the Egiptians dyd paint the yeare lyke to an Adder byting hir tayle, & (not hauing the vſe of letters) they made a Ring, and named it Annulus, as it were Annus, that is to ſay, a yeare: bicauſe a Ring doth turne rounde in it ſelfe as dothe the yeare. The height of ỳ Sun being knowen, you (knowing the day of the moneth, & what yeare it is after the Biſſextilis) muſt turne to the day of the moneth, in the regiment oꝛ table going beforꝛe, where right againſt the day of the moneth you ſhal finde the degrées of declination, and the odde minutes belonging to the degrées of declination following: that being knowen (that is to ſay, the height of the Sunne with the degrées & minutes of the declination) if the Sunne haue Noꝛth declination, you ſhall ſubtract oꝛ take away the Sunnes declination from the height of the Sunne, with the degrées and minutes: and then that which remaineth, ſhall be the true height of the equinoctial: which being knowen, pulling that ſumme out of. 90. with the degrées and minutes,

The greateſt declination to the South

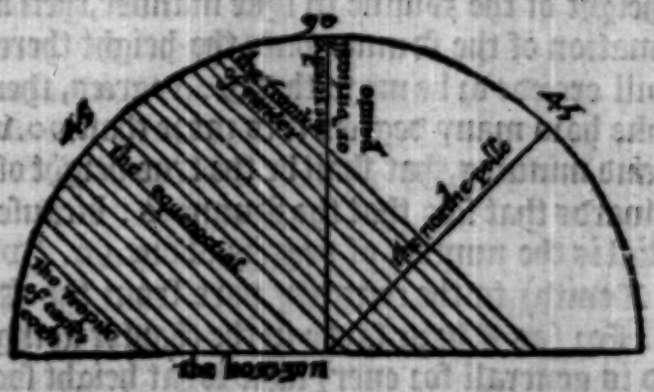
The yeare is compared vnto a Ring or an Adder, biting hir tayle.

The height of the Sunne being taken and knowne.

minutes, ỹ which doth remaine, shall be the true height of the North Pole aboue the Horizon. But if that the Sun hath South declination, you shall adde or put that declination vnto the height of the Sunne, which shall shew vnto you the true height of the Equinoctial: of the which summe (being taken from .90.) that which doth remaine, shalbe the altitude of the North Pole aboue the Horizon. For this is to be noted: loke what height the equinoctiall is aboue the Horizon, it is equal or iust so much betwene the Zenith or verticall point and the North Pole. In like manner, loke how many degrées and minutes are betwéene the Equinoctiall and your Zenith, iust that number of degrées & minutes is from the North Pole, downe to the Horizon, which is the cause that you must pull the height of the Equinoctiall from the Horizon, with the degrées and minutes. For that your Zenith is alwayes .90. degrées from the Horizon, as you sée by this figure.

then how to handle the declination to know the height of the Pole.

Things to be noted as touchig ỹ taking of the Altitude of the Pole.



¶ The.viij.Chapter sheweth you how to handle the declination of the Sunne, when you are between the Equinoctial and the Sunne: that is to say, the Sunne being to the Southwards or Northwards of you betweene the Sunne and the Equinoctial, or vnder the Equinoctial: the height of the Sunne being truely knowen or taken.

NOW furthermore if you be vnto the South parts neare vnto the equinoctiall, so that the Sunne haue any great declination either to the Southwards, or the Northwards, you being betwene the equinoctiall and the Sunne, when you haue taken the true height of the Sunne with the Astrolobe to know the height of any of the.2.Poles, do this: séeke the declination of the Sunne for that daye with ẏ degrées & minuts, the declination being knowen and the height of the Sunne in lyke manner, then adde the declination of the Sunne vnto the height thereoff, and it will excéede or be more than.90.degrées, then againe looke how many degrées it is more than.90.with degrées and minutes, that shall be the true height of the Pole towards that side that the Sunne is: bicause the equinoctial is the number of degrées aboue.90. (which is your Zenith) to the contrary part from the Sunwardes. For (as I haue sayde in the chapter going before, and is generall for euer) looke what height soeuer the equinoctiall is from the Horizon, that is the true distance betwéene the Zenith and the Pole: in lyke maner looke what distance is betwene the equinoctial and the Zenith, the same is the true distance betwene the Horizon and the Pole, that is to say, the Pole is so many de-

A thing to be noted.

ny degrées in altitude aboue the Horizon. As it is a common saying (in knowing how farre we be vnto the Southwards or Northwardes) that the Pole Articke is so many degrées in altitude, or (as some will saye) that we are in so many degrées in Latitude: the question is all one in effect, although the one be called Altitude or height, and the other Latitude or wideneſſe, yet it hath one signification: for as when you say altitude, or height of the Pole, you meane the Pole is rayſed so many degrées aboue the Horizon. So likewyſe when you say Latitude, you meane, you be so many degrées in wydeneſſe from the Equinoctiall: for that your Zenith or verticall point is so many degrées from the Equinoctial. Moreouer if you chaunce to be right vnder the Equinoctiall, as you cannot say that you haue any Latitude, so likewiſe cannot you say that you haue any Altitude, for that the two Poles be then iuſt with your Horizon, and in like manner the Equinoctiall is your Zenith or Uertical point. But when you will take the height of the Sunne with your Aſtrolobe, then loke what declination the Sunne hath, either to the Southwards or Northwardes. Then put the declination of the Sunne vnto the height of the ſame, and the number wil be iuſt. 90. degrées: if it lacketh any thing of. 90. degrées, then it ſignifieth that the Equinoctial lacketh so much of the Zenith, and so much iuſt ſhall the Pole be aboue the Horizon towardes that part that you be in from the Sunnewards. But contrarywiſe, if it doth excede or be any thing more thã. 90. degrees, thẽ (as afore is declared) it ſignifieth that the equinoctial is as much as that number (both in degrees and minutes.) On the contrary ſide from the Sunwardes, that is to ſay, your Zenith ſhalbe betwene the Sunne and the equinoctial, & the Pole ſhall be so many degrées or minutes aboue the Horizon, as is the diſtance betwene the Zenith and

Altitude or Latitude is all one queſtion in effect.

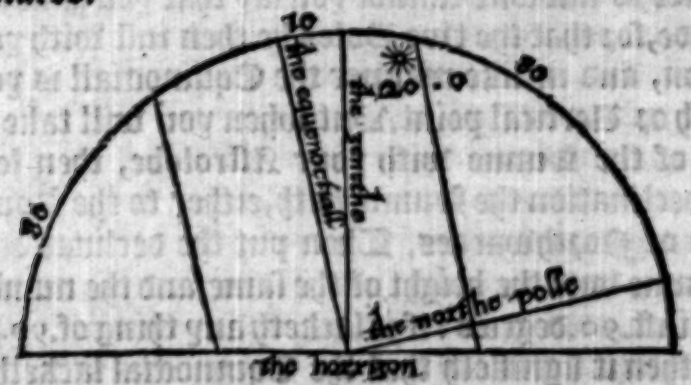
Being vnder the Equinoctiall, you haue neither Latitude nor Altitude, for that the equinoctial is your Zenith, and the Poles your Horizon.

Of your Zenith being betvven the Equinoctial & the Sunne.

the Equinoctiall, towardes that part or side that the Sunne is on. Wherefore I doe thinke it necessary to giue certaine ensamples, (and first take this for an ensample.) Admit I doe take the height of the Sunne vnto the Northwards.80. degrées aboue the Horizon, and the Sunne hath declination vnto the Northwards 20.degrées,to which I adde or put the height, that is to say.80.degrées (being the height of the Sunne)and.20. degrées (being the declination of the Sunne)doe make 100.from which I pull.90.away(which is my Zenith) and so there remayneth.10.degrées.Wherfore you may conclude,ý the Equinoctiall is.10.degrées to the South part of your Zenith, and the Sunne to be.10.degrées to the North part of your Zenith,so ý the North Pole is.10. degrées aboue the Horizon, as by example it is declared.

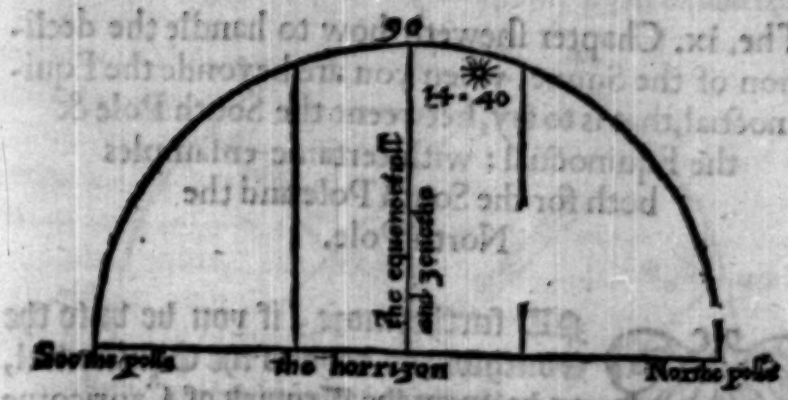
An ensample.

An ensample vvher the Pole is. 10 degrees aboue the Horizon.



And for the second ensample,admit I take the Sun vnto the Northwards.75.degrées and.20. minutes aboue the Horizon,the Sunne hauing North declination. 14. degrées. 40. minutes, I then doe adde or put 14.degrées.40.minutes,vnto.75.degrées.20. minutes, and those two ioyned togither maketh .90. degrées, whereoff you may conclude, that the Equinoctiall is your Zenith,& then the two Poles be with your Horizon,as by this example it doth appeare.

And



And now followeth the third enſample. I admit the Sunne be taken with the Aſtrolobe. 81. degrées and. 15. minutes aboue the Horizon, & the Sunne hath South declination. 22. degrées, 35. minutes, wherefore I doe adde or put togither. 81. degrées and. 15. minutes (beinge the height of the Sunne) and. 22. degrées. 35. minutes (being the declination) and that maketh. 103. degrées, 50. minutes: from which I take away. 90. degrées, (which is my Zenith) ſo that there remayneth. 13. degrées. 50. minutes: ſo that you may ſafely conclude, that the Equinoctiall is. 13. degrées. 50. minutes, vnto the North parts of the Zenith, and then it muſt néedes follow that the South Pole is. 13. degrées. 50. minutes aboue the Horizon, as by this enſample it is declared. An enſample.

The

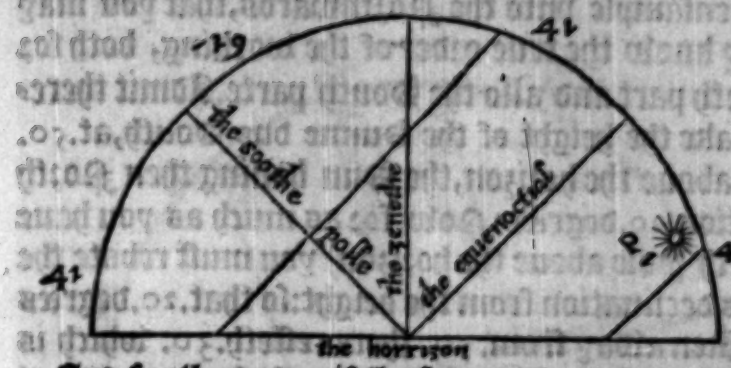
¶ The. ix. Chapter ſheweth how to handle the declination of the Sunne, when you are beyonde the Equinoctial, that is to ſay, betweene the South Pole & the Equinoctial: with certaine enſamples both for the South Pole and the North Pole.

AND furthermoꝛe, if you be vnto the Southwards beyond the Equinoctial, as betweẽ the Tropick of Capricorne and the South Pole, then to vſe the declination of the Sunne to knowe the height of the South Pole oꝛ Antartick Pole, by the height of the Sunne, ther is no other matter in the doing thereoff, but whereas we (being vnto the Noꝛth parts) doe adde the South declination vnto the height of the Sunne, and rebate the Noꝛth declination from the height of the Sunne, ſo in lyke manner the contrary is to be vſed: that is to ſay, to rebate the South declination from the height of the Sunne, and to adde vnto the height of the Sunne the Noꝛth declination. As foꝛ enſample. I admit the height of the Sun be taken. 28. degrees aboue the Hoꝛizon due Noꝛth, and the declination of the Sunne is. 21. degrees vnto the Noꝛthwards, I doe then adde the declination of the Sunne which is. 21. degrees vnto the height of the Sun (being. 28. degrees) which maketh. 49. degrees, and ſo many degrees the equinoctial is aboue the Hoꝛizon vnto the Noꝛthwards, and then (as it is beſoꝛe declared) pull that ſumme out from. 90. degrees, and there remaineth. 41. degrees, which is the diſtance betweene the Zenith and the Equinoctial, which alwayes is equal with the diſtance betweene the Pole and the Hoꝛizon: ſo that you may conclude the South Pole to be rayſed. 41. degrees

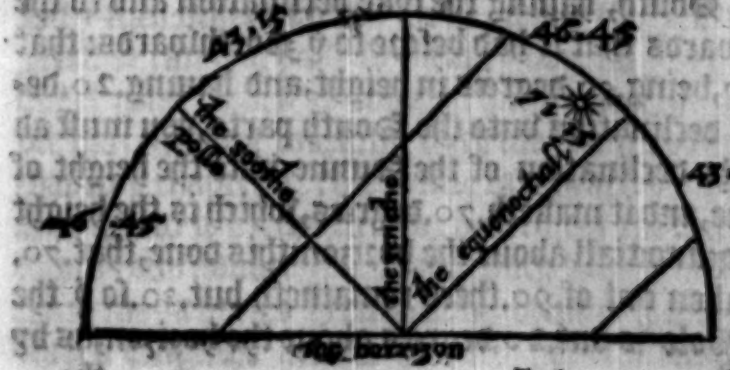
To take the Sun to the Northvvard you being betvven the South Pole and the equinoctial.

An enſample by taking the South Pole. 41. degrees aboue the Horizon.

grées aboue the Horizon. As by this figure it is shewed.

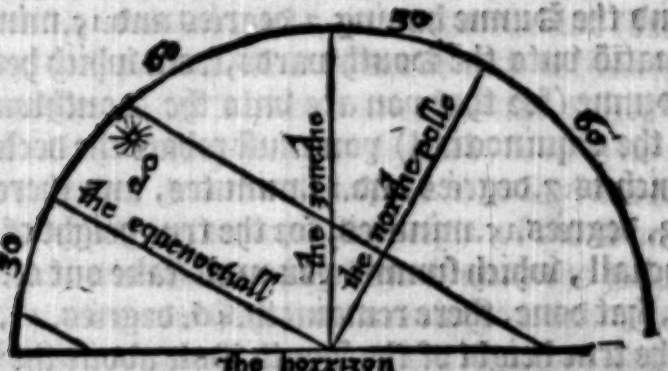


And furthermore, if the Sunne haue South declination, then (as before is declared) you must subtract or take away the Sunnes declination from the height of the Sunne: as for ensample. The height of the Sunne being taken at. 50. degrées. 30. minutes vnto the North parts, and the Sunne hauing. 7. degrées and. 15. minuts of declinatiõ vnto the Southwards, from which height of the Sunne (for that you are vnto the Southwards beyond the Equinoctiall) you must rebate the declination which is. 7. degrées and. 15. minutes, and there resteth. 43. degrées. 15. minutes, for the true height of the Equinoctiall, which summe you must take out of. 90. degrées, that done, there remaineth. 46. degrées. 45. minutes, the true height of the South Pole aboue the Horizon, otherwise called ỹ Antartike Pole, as by ensample of this figure is plainly shewed.



An ensample by taking the North pole.60. degrees aboue the Horizon

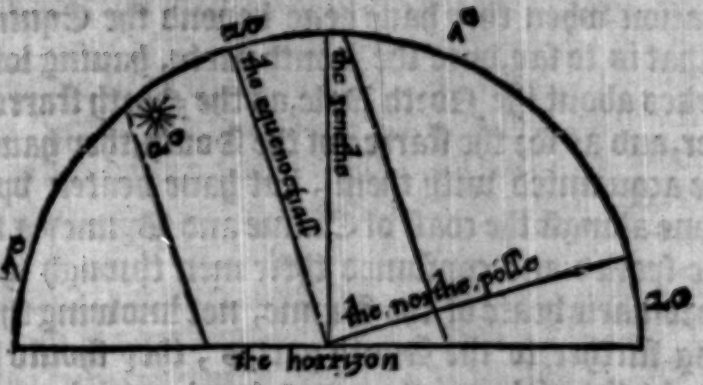
Yet furthermore I doe thinke it conuenient to giue you an ensample vnto the Northwards, that you may perfectly know the true order of the working, both for the North part and also the South parte. Admit therefore I take the height of the Sunne due South, at.50. degrees aboue the horizon, the Sun hauing then North declination.20.degrees: Now (for as much as you haue the North Pole aboue the horizon) you must rebate the Sunnes declination from the height: so that.20.degrees being taken away from.50. there resteth.30. which is the height of the Equinoctiall aboue the horizon, & that 30.being taken from.90.there resteth.60. So that you may boldly affirme the North Pole to be.60.degrees aboue ỳ horizon, as by this figure following it is shewed.



In like manner the Sunne being taken at ỳ height and due South, hauing the lyke declination also to the Southwards that it had before to ỳ Northwards: that is to say, being.50.degrees in height, and hauing.20.degrees of declination vnto the South parts, you must add or put the declination of the Sunne vnto the height of the same, and it maketh.70.degrees, which is the height of the equinoctiall aboue the horizon: this done, that.70. being taken out of.90.there remaineth but.20.so ỳ the North Pole is but.20.degrees aboue the horizon, as by

the

the ensample of this figure is shewed.



For in handling of ỹ declination the true height of any of the Poles is knowen. Allwayes hauing this consideration, that if they haue the North Pole aboue the horizon, they doe allwayes ad or put to the height of the Sun, the South declination & ỹ Sun hauing North declination, they pul away the Sunnes declination from the height theroff. Now contrarywise, if the South pole be aboue the horizon, you must ad the North declinatiõ vnto ỹ height of the Sun, & take away the South declination frõ the height of ỹ same. Now to know which of the .2. poles be aboue the horizon, is a very easy matter, & is knowne .2. waies. For first if the North pole be aboue the horizon, you may know it by all the starres round about ỹ Pole, as Charles wayne, & the Guardes, with such other markes as be about the North Pole. Neither can you passe so sodenly beyond ỹ equinoctial, but it must needes be knowen vnto you, & thẽ you must vse that kinde of working with the Sunnes declinatiõ, that in ỹ chapter or rule before is rehearsed: & also you may know it by the Arke or bearing of the starres and lights roũd aboute you. Thus much haue I said as touching the Sunnes declination, bicause I knowe that diuers Englishe menne would haue trauelled further

A thing to be noted in the handling of ỹ Suns declination.

How to knowe which of the two Poles be vnder the Horizon.

The cause why englishmen

haue not traueled far beyõd the Equinoctial.

beyond the Equinoctiall than they haue done, but that they haue not hadde the capacitie to handle ỹ Suns declination when they haue bene beyond the Equinoctiall, that is to say, vnto the South parts, hauing lost the markes about the North Pole, as the North starre and other, and as for the starres of the South, they haue not bene acquainted with them, but haue beaten vp and downe alongst the coast of Ginnie and Bynney, & there haue spoiled and consumed their men through the extraordinarie heate of the Sunne, not knowing that in going further to the South partes, they should haue brought themselues into a good temperate clymate againe.

An vntẽperate place for extreme heate. Tẽperate clymate.

¶ The. 10. Chapter sheweth, how to handle the Sunnes declination vnto the Northwards, where the Sun doth not set vnder the Horizon, and also to take the Sunne at the lowest being due North.

FOR further vse of the Sunnes declination, if you haue any occasion to trauel vnto the Northwards or Southwards more then. 67. degrees of altitude of any of the. 2. Poles, or if the Sunne haue any great declination vnto those parts that you are in, then shall not the Sunne go downe vnder the Horizon in a long time, after as you be in distance vnto the North parts, for if you were right vnder either of the. 2. Poles of the world, then would not the Sun go vnder the Horizon in halfe a yeare, so that there should be continually day: And now for the handling of the Sunnes declination, to know the height of the Pole, and to take the Sunne North at the lowest, doe this: First with your Crosse staffe obserue the Sunne at the lowest, taking the true distance betwéene the Horizon and the Sunne, that being

Of being vnder either of the poles.

Of taking ỹ height of the sun due north

ing

ing truely done, loke what declinatiō the Sunne hath, then haue you to consider, that except the Sun be neare vnto hir greatest declination, that is to say, in the latter ende of Gemini, (or the beginning of Cancer,) the Sun doth declyne little in. 24. houres: but if the declination be very swift, you must seeke the Sunnes declination vpon the day before, and the day after, halfe the diuersitie of which shall be the Sunnes declination: for that the Sunne is at the angle of mydnight. The Sunnes true declination being knowne, rebate the height of the same from the declination of the Sunne, & so shall you haue the true content in degrees and minutes, that the Equinoctial is vnder the Horizon due North, and then pulling that summe from. 90. that which remaineth, shall be the height of the Pole aboue the Horizon: for (as it is before declared) loke what height the Equinoctial is aboue the Horizon, that is equall the distance betweene the Pole and the Zenith, and loke what distance is betweene the equinoctiall and the Zenith, the same distance is betweene the Pole and the Horizon: in lyke manner, loke how deepe vnder the Horizon the Equinoctiall is vnto the Northwards, so farre equal is the height of the equinoctial vnto the Southwards. As for ensample: admit I were vnto the Northwards of the North cape, the Sunne being in hir greatest declination vnto the Northwards, which is about the 11. day of June, 23. degrees & neare a halfe: this being knowen, I take the Sunne due North at the lowest, iust. 6. degrees aboue the Horizon, the declination being. 23. degrees and. 28. minutes. Wherefore I rebate from that 6. degrees, and so there remaineth. 17. degrees and. 28. minutes. For the depth of the equinoctial vnder the Horizon, and then doe I pul that summe from. 90. and there remaineth. 72. degrees. 32. minutes, for the true height of the North Pole aboue the Horizon, as by this en-

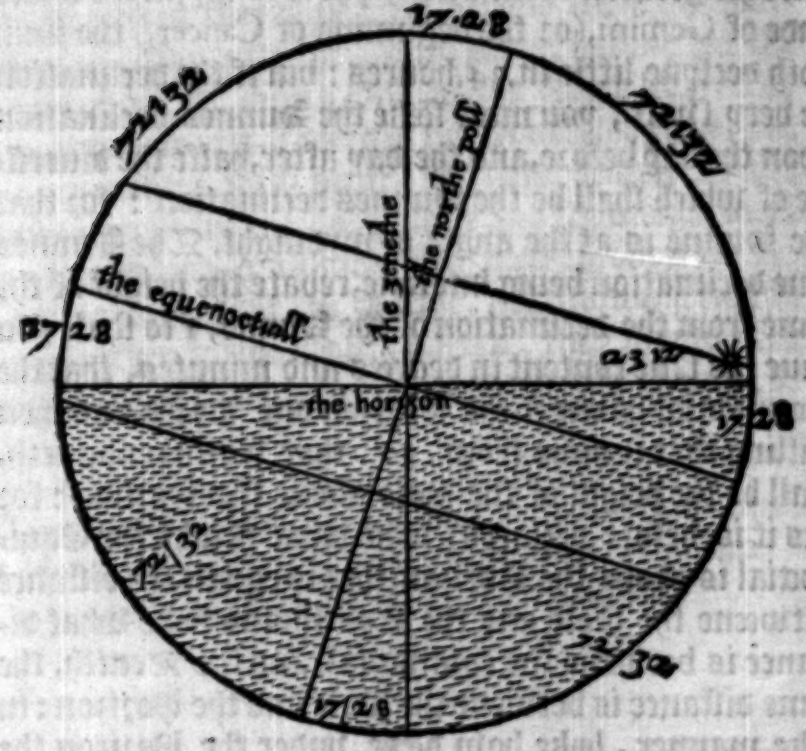
at & lowest.

A thing vvorthy to be noted, touching the Sunnes declinatiō

A thing to be noted of the pole and the Equinoctial & Zenith, & the Horizon.

The Sun taken due North at 6. degrees.

sample it is declared.



By this ensample you may also know ỹ true height of any of the.2.poles,and how to obserue the Sunne at the lowest,when the Sunne commeth nearest vnto the Horizon,as well as you may when the Sunne is vpon the Meridian at the greatest height from the Horizon, which is very necessary for them that do occupie vnto the Northwards,as vnto Saint Nicolas in Rouley,it is also very necessary for them that would attempt any voiages of discouery to finde out the passage to come vnto Catay and China, and the Ilands of Moluccas, vnto the Northwards,as into the East by Noua Zemla, or to the West by that way that Captaine Frobisher,

Of voiages for discouery to the Northvvards either to ỹ Eastward

hath

hath begun to the Northwards of Baculayas and Labrador, for it is to be supposed that amongst that broken landes and Ilandes, that there may be founde passage vpon the North part of America, but the great quantities of Ice may somewhat hinder the prosperitie of that discouery, and yet notwithstanding my opinion is that it is not frozen there so much to haue such huge quantitie of Ice, but that it may be frozen more farther vnto the North parts, and so by some current or streame brought thether, and so is stayed vpon the coast of Labrador and Baculayas, by the meanes of the great current ꝑ commeth out of the Bay of Merico, al alongst the North side from Floriday vnto Baculayas or New found lande.

by Noua Zemla, or to ꝑ vvest vvard by cape de Paramantia.

Additiõs

And yet notwithstanding, it may be possible that if that they dyd discouer more vnto the Northwardes, that they should not mæte with so much Ice. For at the North Cape in Norway which is much more vnto the Northwards, there is seldome sæne any great quantitie of Ice, and yet some shippes hath bæne beaten off vnto the North of the Cape, neare two leages, so that they hadde then neare .80. degrees of height off the North Pole aboue the Horizon, and yet they haue not met with Ice, and yet it is farther vnto the North partes by .17. degrees, then that place that Frobisher was at.

Wherefore if it were attempted, there is no doubt but they should finde it nauigable either to the East part, or to the West part: And I am of this opinion, that the thing most feared in making their discouery vnto the Northwarde, deserueth not so greatly to be feared as they doe make it, the cause why they are so loth to goe very farre vnto the Northwards is, for that it is the frozen Zone, but my opinion is, that in sommer tyme it is not to be feared, but the further vnto the

North-

Northwards, the more temperate warme, by meanes of the long continuance of the Sunne: for as we see by common experience, ỳ a thing once being made warme, cannot sodenly be made colde, neither is ther doubt of any great cold vntill the Sun be vnto the Southwards of the Equinoctiall: for I admit that a ship should saile vnto the Northward, & not stay vntill the North Pole were eleuated. 80. degrees aboue ỳ Horizon, I do thinke then they should finde it very temperate and warme vnto the middle of September, for that by the space of 9. wækes togither (that is to saye, from the. 10. daye of May, vnto the. 12. day of July) the Sunne should come no nearer vnto the Horizon due North than. 10. degrees and. 30. degrees vnto the South part aboue the Horizon, and yet it is possible that it may be colde there vntil the ende of May, for that the Sunne must haue a tyme to make the aire warme. For like as a thing once being cold, cannot be sodainely made warme, so in lyke manner a place being once made warme, cannot be sodainly made colde. And furthermore he that were in the Latitude of. 80. degrees, should haue but a short paralel: for the whole compasse of the earth and Sea going East & West to come rounde about to that place againe in the same paralel, is but. 1250. English leagues, euery league conteining. 3. English myles: So that in sayling of lesse than. 500. or. 600. leagues, they might see whether it wer nauigable or not. For this is one principle, that if that they doe not mete with land then they shal finde sea, to accomplish the long desyred passage to finde out Cattaye.

Of temperatenesse the Pole being rayſed. 80. degrees.

The lẽgth of the paralel. 80. degrees is but. 1250 English leagues.

The

¶ The.xj. Chapter doth ſhew how you ſhall know the length of the day, and to know how much the day is ſhortned or lengthned by the Sunnes declination.

NOw I thinke it conuenient for Seafaring men to knowe the length of the day in any place that they haue occaſion to goe vnto: for that they haue occaſion to trauell into all the climates & places, tranſporting themſelues many times quickly from one place vnto another: & although the auncient writers haue appointed certain climates, and other late writers in lyke manner haue made tables very exact for the longeſt or ſhorteſt day in any of thoſe climates, and other places, according to the eleuation of the Pole: yet haue they not opened any way vnto them, in giuing any order, for them to know when ỹ day is an houre longer or ſhorter, wherby they might at all times know the length of the day, which notwithſtãding is very neceſſary for them, for ỹ they be abroad vnder ſayle both night and day, and in like manner for that they muſt kẽpe account of houres and tymes exactly, in as much as they ought to kẽpe an account of the ſhippes way: wherefore it muſt nẽdes be moſt neceſſary for nauigation, to knowe the true tyme of the Sunnes ryſing and ſetting, which you ſhall know by this meanes: Firſt this is not vnknowne, that vnder the Equinoctial the Sunne is.12.houres aboue the Horizon, and.12.houres vnder the Horizon, (what declination ſoeuer the Sunne hath) ſo that there the Sunne riſeth at.6. of the clock & ſetteth at.6. of ỹ clock for euer. And where the Pole is rayſed.16. degrees and.44.minutes, there the longeſt day is.13.houres, (the Sun hauing

How neceſſary it is for a Seafaring man to knowe the length of the day.

Vnder the equinoctial ỹ day is alwaies 12.houres long.

The Pole

16.degrees 44.mi.the daye. 13. houres long,vvhē it is at the longeſt.

uing hir greateſt declination at.23.degrées.28.minuts) and the ſhoꝛteſt daye is. 11. houres long:and then loke when the Sunne hath declined.23. degrées and a halfe either backwardes oꝛ foꝛwardes, foꝛ then the day is an houre longer oꝛ ſhoꝛter and pꝛopoꝛtionably: when the Sunne hath declined.11.degrées.44.minutes,then it is halfe an houre longer oꝛ ſhoꝛter.&c.Moꝛeouer wher the

The Pole 30 deg.48 mi. the lōgeſt day 14.houres long.

Pole is eleuated.30.degrées.48.minuts,there the longeſt day is.24.houres,and the ſhoꝛteſt day is.10. houres long,the Sun then ryſing at.5.of the clock,and ſetting at.7.of the clock,and there when the Sun hath declined 11.degrées and.44.minutes from the Equinoctiall.&c. vnto the greateſt declination,then the daye is an houre longer oꝛ ſhoꝛter; and when the Sunne hath declined 5.degrées.52.minuts,then the day is halfe an houre lon-

The Pole 41.deg.23 mi. the lōgeſt day 15.houres long.

ger oꝛ ſhoꝛter,&c. Furthermoꝛe alſo, where the pole is rayſed.41.degrées.23.minutes,there the longeſt day is 15.houres,and the ſhoꝛteſt.9. houres long, (the Sunne hauing his greateſt declination,and as then riſing at.4 of the clock.20.minutes,and ſetting at.7.of the clocke 30.minutes) ſo that there when the Sunne hath declined.7.degrées.49.minutes from ẏ Equinoctial,the day ſhall be an houre longer oꝛ ſhoꝛter, & when it hath declined.3.degrées.54.minutes, the daye ſhall be halfe an

The Pole raiſed.49 deg.1.mi. then the lōgeſt day is 16.hou. long.

houre longer oꝛ ſhoꝛter.&c.And furthermoꝛe,where the pole is rayſed.49.degrées,one minute,there the longeſt day is.16.houres,and the ſhoꝛteſt.8.houres long,ẏ Sun ryſing at.4.of the clocke,and ſetting at.8.of the clocke, ſo that there when the Sunne hath declined.5. degrées 52.minutes from the Equinoctial,then ſhal the daye be an houre longer oꝛ ſhoꝛter. And when the Sunne hath declined.2.degrées.56.minutes,then the day ſhal be half

The Pole raiſed.54. degr. 30.

an houre longer oꝛ ſhoꝛter.&c.Yet furthermoꝛe, where the pole is rayſed.54.degrées.30.minutes,ther the longeſt day is.17.houres, and the ſhoꝛteſt.7. houres long,

the

the Sunne then rysing at.3.of the clock.30.minutes,& setting at.8.and.30.minutes: then when the Sunne hath declined.4.degrées and.41.minutes from the equinoctiall,to the greatest declination,the day is an houre longer or shorter, and when he hath declined.2.degrées 21.minutes,the day is halfe an houre longer or shorter, &c.Where also the Pole is rayſed.58.degrées.27.minutes,there the longest day is.18.houres long,and the shortest but.6.and then when the Sunne hath declyned 3.degrées.55.minutes from the Equinoctiall, then the daye shall be an houre longer or shorter: and when the Sunne hath declined.2.degrées, lacking.2.minuts,then the day shall be halfe an houre longer or shorter.Furthermore also,where the Pole is rayſed.61.degrées.18.minuts,there the longest day is.19.houres long,and the shortest but.5.houres: then shall the Sunne ryse at.2.of the clock.30.minutes,and set at.9.and.30.minutes, and then when the Sunne hath declined.3.degrées and 21.minutes from the equinoctiall,then shall the daye be an houre longer or shorter.&c. Furthermore,where the Pole is rayſed.63.degrées.22.minutes,there the longest day is.20.houres long, and the shortest but.4.houres, then shall the Sunne ryse at two of the clocke,and set at tenne of the clocke,and when the Sunne hath declined two degrées,and fiftie fire minutes from the equinoctiall vnto the greatest declination,then shall the day be an houre longer or shorter.&c.

mi.then ỹ lõgest day is.17.hou. long.

The Pole raised.58 deg.27. mi. the lõgest day is 18.hou. long.

The Pole rayſed.61 deg. 18. mi. the lõgest day is 19.hou. long.

The Pole 63. deg.1. mi. the lõgest day 20.houres long.

Now where the pole is rayſed.64.degrées.49.minutes,there the longest day shal be.21.houres long,and the shortest but three houres: And then when the Sun hath declined but.2.degrées.36.minutes from the Equinoctiall vnto the greatest declination,the day shal be an houre longer or shorter. Where also the Pole is rayſed 65.degrées, there the longest day shall be.22.houres,& the shortest but two houres long, and when that the

The Pole rayſed. 64 deg.49. mi.the lõgest day 21.houres long.

The Pole 65.deg. the lõgest daye.22. hou. long

Sunne hath declined but.2.degrées &.20.minuts from the Equinoctial.&c.then the day shall be an houre longer or shorter. &c. And where the Pole is rayſed. 66. degrées.20. minutes, the longeſt daye shalbe three and twenty houres long,& the shorteſt but one houre long, and then when that the Sunne hath declined but two degrées.8.minuts,then the day shall be an houre longer or shorter, and then where that the North Pole is raiſed.66.degrées and.32.minutes, there it is.24.houres long, for that when the Sunne hath his greateſt declination vnto the Northwardes, then at mydnight you shall sée halfe the Sunne, and then when that the Sun hath the greateſt declination vnto the South parts, thē you shall sée but halfe the Sunne at noone, and then in the going but.15.miles further vnto the Northwardes, that is,but one quarter of a degrée, then the Sun shall be cleane aboue the Horizon at the due North, and not séene vnto the South at noone aboue ỹ horizon,the Sun hauing his greateſt declination to the South, and then the day shalbe an houre longer or shorter,when that the Sunne hath declined one degrée.57. minutes from the Equinoctial,and so forth vnto the greateſt declination. And thus much haue I sayde as touching the length of the day, whereby you may know at all tymes the true length of the daye in any Latitude betwene the Equinoctial and the eleuation of the Pole at.66.degrées and 32.minutes, by knowing how many degrées the Sun is declined,& that you may know on euery daye by the regiment going before, hauing this conſideration,that if the Sunne being vpon the Equinoctiall, and hauing no declination, that then in any Latitude the day is alwaies iuſt.12.houres long.And you muſt note this,that it is called the day,from the ryſing of the Sunne, vnto the ſetting of the ſame vnder the Horizon,and not from day light vnto day light. For before the Sun ryſe,and

The Pole 66. degr. 20.mi.the lōgeſt day 23.hou. long.

The Pole 66.deg.32 mi.then ỹ Sun ſhall not ſet vn to them.

The Sun cleane aboue the Horizon due north & not to appeare aboue the Horizon South, at noone.

To knovv the lēgth of ỹ day at any time in any place. What the day is.

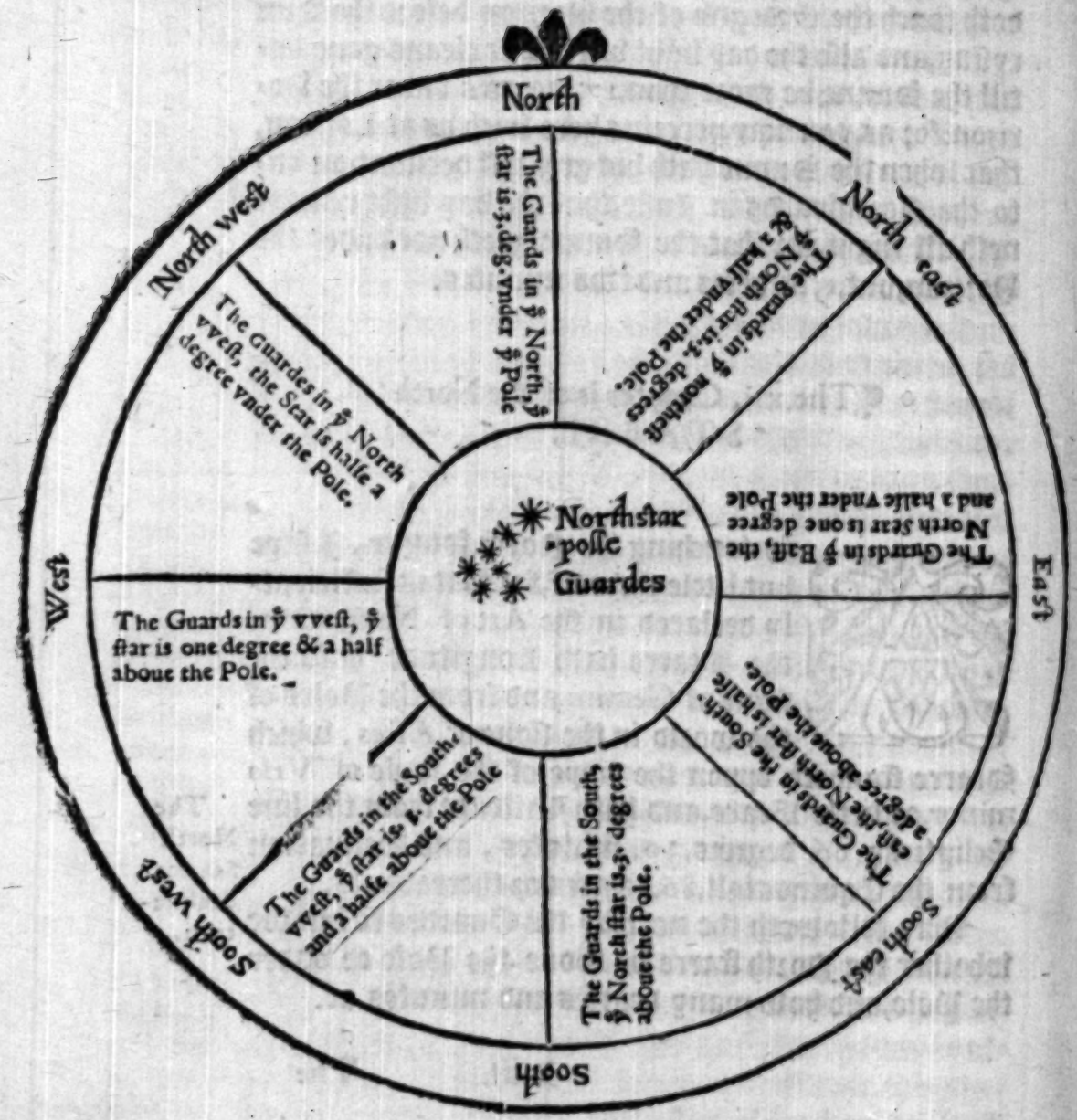
after

after that the Sunne is sett, it is counted for no parcell of the day, but it is called ỹ day light. And furthermore, the day light wil appeare by that time that the Sunne doth touch the .17. degrée of the Horizon before the Sun rysing, and also the day light wil not be cleane gone vntill the Sunne be more than .17. degrées vnder the Horizon: for as you may perceiue here with vs at London, that when the Sunne hath his greatest declination vnto the Northwards in June, that the day light remayneth all night, for that the Sunne goeth not vnder the Horizon, but .15. degrées and two minutes.

¶ The .xij. Chapter is of the North STARRE.

AS touching the North Starre, I saye but little thereoff, for that is sufficiently declared in the Art of Nauigation, the Starre hath Longitude vnto the signe of Gemini, and from the Poles of the world in the signe of Aries, which Starre standeth vppon the tippe of the tayle of Vrsa minor, or little Beare, and hath Latitude from the line Eclipticke. 66. degrées. 30. minutes, and declination from the Equinoctiall. 86. degrées or thereabouts. The North Starres declination.

Here followeth the note, by the Guardes to knowe whether the North starre be aboue the Pole or vnder the Pole, and how many degrées and minutes. &c.


North
North east
East
South east
South
South west
West
North west
Northstar
-posse
Guardes
The Guards in ♄ North, ♄ ſtar is 3. deg. vnder ♄ Pole
The Guardes in ♄ North ♄ North ſtar is 2. degrees & a half vnder the Pole.
The Guards in ♄ Half, the North ſtar is one degree and a halfe vnder the Pole
The Guardes in the South, the North ſtar is 2. degrees aboue the Pole.
The Guards in the South ♄ weſt, ♄ ſtar is 1. degrees and a halfe aboue the Pole
The Guards in ♄ North ♄ weſt, the Star is halfe a degree vnder the Pole.
The Guards in ♄ weſt, ♄ ſtar is one degree & a half aboue the Pole.

¶ The.13. Chapter doth ſhew you by the ſayling vpon the quarter of your Compaſſe, in how farre ſayling you doe rayſe a degree, and what you do depart from the Meridian, and in the ende there is a demonſtration theroff: reckning it as you doe ſayle vpon a flat, but not Spheral.

FVrthermoꝛe, bicauſe there be ſome that deſire to knoẅ the alteration of a point: to this ende, that in running of one point, they may rayſe oꝛ laye a degrée ſoner in one than in an other: as in the ſayling South oꝛ Noꝛth, kéeping one Meridian they raiſe oꝛ lay the Pole. As this foꝛ example: In going to the Noꝛth, you doe rayſe the Pole, and lay the Equinoctiall: contrarywiſe, going towards the South, you lay the Pole, and rayſe the Equinoctiall. But in ſayling oꝛ going Eaſt oꝛ Weſt, you you doe neither alter your Pole noꝛ Paralel, but onely your Meridian. Whereas in ſayling of any other point, you doe alter both your Pole & Paralel, and alſo your Meridian. Wherefoꝛe I will open vnto you (in ſayling vpon one of the quarters of the Compaſſe) what euery point doth rayſe oꝛ lay one degrée, in hoẅ farre ſayling, and hoẅ many myles you be departed from the place you departed from, and what ſpace you be departed from your Meridian.

In going Southwards you raiſe the equinoctial, and lay ỹ pole

In going to ỹ north vvardes rayſe the Pole and lay the Equinoctiall.

But here is one thing to be noted (as I ſuppoſe) in the moſt part of cardes they alloẅ foꝛ euery degrée, but 17. leagues and a halfe: your cardes be moſt commonly made in Liſhborne, in Portugal, in Spayne, oꝛ elſe in Fraunce. But as I take it, we in Englande ſhould alloẅ thꝛée ſcoꝛe myles to one degrée: that is, after thꝛée myles to one of our Engliſhe leagues, wherefoꝛe twenty of our Engliſhe leagues ſhould anſwere

Of Engliſh leagues and Spaniſh leagues.

to

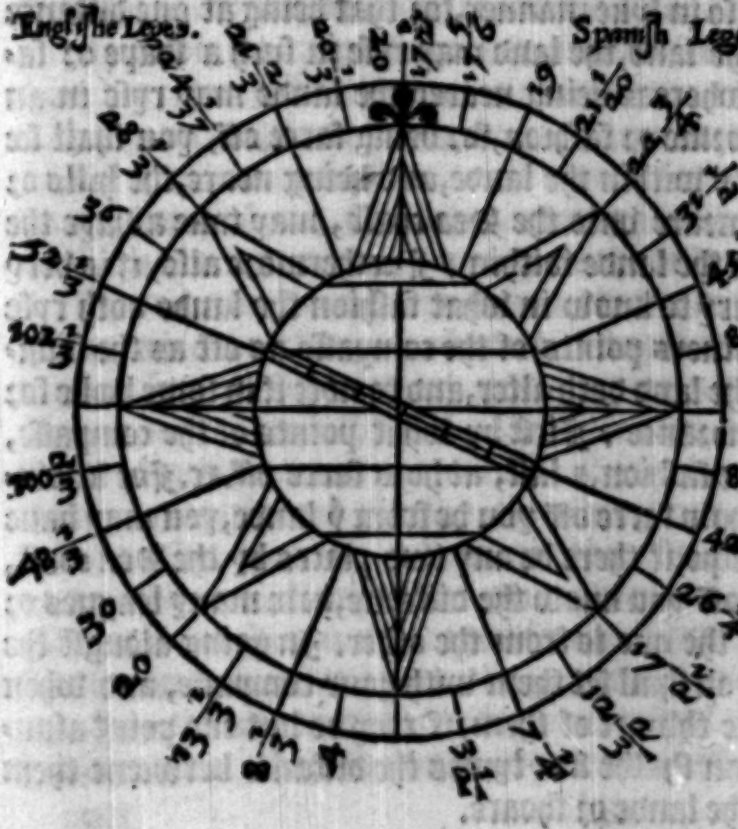
to one degrée, for that three of our myles will not make one of their leagues. And bicause they make their accounts by their leagues in the Cards, and not by ours, therefore I will shewe you by our English myles. An English myle conteineth a thousand pases, and euery pace fiue foote, & euery foote twelue ynches. Now some thinke that a pace cannot be fiue foote, but a pace Geometrical is two reasonable steppes, for it cannot be a pase, vntill the hinder foote be remoued forwards, and those two steppes will containe fiue foote, and so may any man indure to goe at pleasure. But now to our purpose. For the sayling of one quarter of the Compasse, this is to be noted: First that in sayling directly South or North, you doe raise or lay the Pole a degrée in three score miles going. In ỹ altering of one point from the South or North in three score and one myles: and you be departed from the lyne of the East and West, or the Meridian twelue myles. In altering of ỹ second point, you raise a degrée in sayling three score and fiue miles: and depart from your Meridian. 25. myles. In altering of ỹ third point, you doe rayse or lay one degrée in sayling three score & twelue myles and a. 9. part: and are departed from your Meridian. 40. myles. Moreouer, in altering of the fourth point, you doe rayse or lay a degrée in the going of foure score & fiue myles: and depart from your Meridian three score myles. In altering of the fift point or wynde, you raise a degrée in the sailing of. 108. myles: and depart from your Meridian foure score and ten myles. In sayling by the sirt point, you rayse or laye one degrée in. 157. myles: and depart from your Meridian line. 145. miles. Last of all, in sayling by the seuenth point or wynde, you doe rayse a degrée in going of. 308. myles: and depart from your Meridian line. 302. myles: and after this manner you may consider of the other three quarters of the Compasse. But if you

A degree is. 60. miles or 20 English leagues.

A note to knowv in how farre sayling you doe rayse or lay a degree in ỹ sayling by any one point of the compasse.

you require to know the rayſing or layeing of a degrée by the leagues of the Cardes: that is, at .17. leagues and a halfe: then reade the Art of Nauigation, and there ſhal you finde how many degrées you be departed frō your Meridian, & alſo from the place that you departed from: and yet that ſerueth for none other place but onely for vnder the Equinoctial, for he that maketh account of it in any other place, ſhall be deceiued. For euer as you goe to any of the two Poles, your degrées be ſtill ſhorter and ſhorter, tyll ſuch tyme as your Meridian méete vnder the two Poles, whereoff I intreate in the ſixtene Chapter.

For the better vnderſtanding of the thinges aforeſayd, looke on this figure following.



M.j. The

¶ The.14. Chapter teacheth to know how farre any land is off from you, knowing but the distance betwen any two places: whether you runne along by the land or directly to the shoare, or otherwise: with other necessary thinges.

FOR that I know it very necessary and profitable for Sea menne, to know how neare or farre they be into the Sea, and how neare to the land. I wil intreate thereoff for diuers considerations. And first, bicause in running alongst the land there may be daunger, which may be such a certain quantitie into the sea, that they may go both within them and without them. And also in lyke manner, for that being at one distance from the land, the land may ryse in such a shape or fashion, whereas being nearer, the lande may ryse in an other forme or fashion, for being farre off, you shall se the hills within the lande, and being neare, the hills or cliffes neare vnto the Sea coast, may take awaye the sight of the lande within. Furthermore also, it is very necessary to know in what fashion the lande doth ryse vpon diuers points of the compasse, as oft as the fashion of the land doth alter, and to note it in some booke for remembrance. First by what points of the compasse, then the fashion, & last, at how farre off. &c. For knowledge how farre off you be from ỹ lande, you may haue this helpe, if there be any two places by the Sea coast, whereoff you know the distance, how many leagues or myles the one is from the other. In going alongst the coast you shall set them with your compasse, and when you are thwart of them, if they be but one point asunder, you shalbe fiue tymes the distance betweene them from the lande or shoare.

A note for ỹ land rysing in diuers shapes or fashions.

To knovv hovv far the land is frō you

Where two lands be but one point asunder.

If the two places be two points asunder, then the distance vnto the shore shall be two tymes and a halfe the distance. If. 3. points asunder, then the distance vnto the shoare shall be once the distance and a halfe. If. 4. points asunder, the same distance shall be betwéene you and the shoare, that is betwene the two markes. If fiue points asunder, then is it vnto the shoare but two third parts of the distance betwéene the. 2. places. If. 6. points asunder, (you being thwart of one of thē) then shall the stance vnto the shoare be, not halfe the distance betwen the two places. And in all these cases before rehearsed, the one place must be thwart of you, the other must be a head or sterne of you: and so it is exact and true. As for ensample this: I (going alongst by any coast) doe know before hand how ẏ one place doth beare from the other, besides this also I know the distance, that is to say, how many leagues they be asunder. As for ensample, the. 2. places assigned beare East and West the one from the other, I then (knowing that they be. 3. leagues asunder) when I haue brought one of the places South or North of mée, do set them with my compasse, the one being North of mé, & the other bearing North and by East, that is one point asunder: Now the distance vnto the shoare, being. 5. times the distance betwene the two places which be. 3. leagues asunder, I know the shoare to be. 15. leagues from me, which (if the places were but one league asunder) should be but. 5. leagues from the shoare. Furthermore, if the places be. 2. points asunder, that is to say, the one North, & the other North North-east, then shal the distance vnto the shoare be. 7. leagues & a half frō me. Wheras if ẏ. 2. places wer but a league asunder, it should be but. 1. leagues & a half vnto ẏ shore. And furthermore, if the places be. 3. points asunder, that is to say, the one north, & ẏ other northeast & by north, ẏ distāce vnto ẏ shore shalbe. 4. leagues & a halfe: wher-

Of two places to be 1. point asunder.

To be 2. points asunder.

3. points asunder.

As if the two places were but one league asunder vnto the shore, it should be but a league and a halfe. If. 4. points asunder, ý is to say, if ý one place be due North, and the other place Northeast, then it is vnto the shore three leagues iust. If but one league asunder, then but one league vnto the shore. Moreouer if ý two places be fiue points asunder, that is to say, the one North, & the other Northeast and by East, then the distance vnto the shore shall be but. 2. leagues: whereas if the. 2. places were but one league asunder, vnto the shore should be but two miles. Last of all, if the two places be. 6. points asunder, that is to saye, the one North, & the other East Northeast, then it shall not be a league and a halfe vnto the shore. &c. But if you come directly to the landewardes, hauing no cause to be thwart of none of those knowne places, then to know how far you be from the land, you must do as is by the places before spoken off. For if you go in due North, the one place being North & by west, & the other North and by East, then (the. 2. places being. 3. leagues asunder) you shal be. 7. leagues and a halfe from the shore: so that if you runne into the shore due North, vntil they be. 4. points asunder, that is to say, the one North Northwest, and the other North Northeast, then it shal be vnto the shore. 3. leagues and 3. quarters. And furthermore, you still running in due North till the. 2. places be. 6. points asunder, that is to say, the one place to be Northwest and by North, & the other place to be Northeast & by North, the distance vnto the shore shalbe. 2. leagues & a quarter. And againe, if you runne in due North, vntill they be. 8. points asunder, that is to say, the one place Northwest, & the other Northeast: then the distance vnto the land or shore, shal be but halfe the distance betweene the. 2. places, that is, but one league and a halfe. Lastly, if you runne to the land due North, vntil the. 2. places be. 10. points asunder,

4. points asunder.

5. points asunder.

6 points asunder.

Of going or sayling right into the shore.

that

that is to say, the one place Northwest and by west, and the other Northeast and by East, then the distance vnto the shoare shalbe but one third part of the distance betwene the.2. places, ỹ is, but one league from the land, &c. Thus much haue I sayd as touching the bearing of the land from you, by ỹ points of the compasse, to know the distance, or how farre the land is off: which is very necessary for Seamen to know, for diuers considerations, as I sayde before. If now therefore you know not how one headland doth beare from another, doe thus: in running alongst the coast, when you see the appearing of any land one before an other, set thē with your compasses, and loke how they beare from you, by what point of the compasse, and so shall you know iustly, how the one lande doth beare or lye from the other. And by this order you may correct your plats, by doing this, as often as you see.2. notable places togither: as Ilands, rocks, headlands, mouthes of hauens, sands, or whatsoeuer else be worthy of noting, this done, as often as you doe see them togither, set them with your compasse, and that wil shew you most certainly, that so they doe beare the one from the other. You may know the distance in like manner betweene them, if you know your shippes way, as thus, when you first see any.2. places togither, as two headlands, or two Ilands, hauing set them with your compasse, and knowing how the one beareth from the other, then, for that you will not come neare vnto them, you do hale off from the land vntil that you haue brought your selfe farre ynough off, at your discretion, & when you be thwart of the first headland, set the other land, and consider how it beareth from you: then recken your shippes way, how many leagues the shippe might goe, vntill you come thwart of the other headlande, kéeping, your course along as the.2. headlands beare, & so shal you both know the distance betwene the.2. places, &

A vvay to knovve hovv one headland beareth of an other.

To knovv ỹ distance at Sea betvvene any tvvo headlāds.

To knovv hovv far it is vnto the land another vvay.

also how farre you be off from them. In like manner, hauing consideration of the distance betweene the other places that you haue obserued, both by your compasse, & also the shippes way, you may know how farre it is to the shoare, going right to the landwards, by your crosse staffe, although you know not the distance betwen any two places.

As thus: take the wideneſſe betweene anye two places with your Crosse staffe, bearing right to the landwards, & then remoue the crosse staffe, or transuastory, half the length of the transuastorie, ỹ is to say, the ende next vnto you, and then by running in till the .2. endes of the transuastorie doe agrée with the .2. marks, you shalbe halfe way to the shoare: then loke how far the shippe hath gone in that time, for the same distance is vnto the land from the shippe. But if you remoue the transuastorie but a quarter ỹ length of the transuastorie to you-wards, then at the place wher the ende of the transuastorie doth agrée with ỹ two marks, shalbe one quarter of the distance betwene the shoare & you at the first obseruation; & it shalbe .3. times ỹ quantie vnto the shore. &c.

As I doe farther shew the conclusions of the crosse staffe in my booke called the Treasure for trauailers, the first booke the .10. 11. 12. 13. and .14. Chapters. And

To knovv the ships vvay.

to know the shippes way, some doe vse this, which (as I take it) is very good: they haue a pece of wood, & a line to vere out ouer borde, wᵗ a small line of a great length, which they make fast at one ende, & at the other ende, & middle, they haue a pece of a line, which they make fast with a smal thread to stande lyke vnto a crow-sote: for this purpose, that it should driue a sterne as fast as the shippe doth go away from it, alwayes hauing the line so ready, that it goeth out as fast as the shippe goeth. In lyke manner they haue either a minute of an houre

glasse

glaſſe, or elſe a knowne part of an houre, by ſome number of wordes, or ſuch other lyke, ſo that the line being vered out, and ſtopt iuſt with that tyme that the glaſſe is out, or the number of wordes ſpoken, which done, they hale in the logge or péece of wood againe, and loke how many fadame the ſhippe hath gone in that time: that being knowne, what part of a league ſoeuer it be, they multiply the number of fadams, by the portion of time or part of an houre. Whereby you may knowe iuſtly how many leagues and parts of a league the ſhip goeth in an houre. &c. As for enſample this: I hauing a minute glaſſe, but it is better for to haue a portion of time by ſome number of wordes, and the leſſer part of tyme that you haue it is the better, for if that the ſhippe doeth go very faſt, you ſhall not haue to muche lyne out, and if that the ſhippe doeth goé but ſlowlye, then you may double the length of tyme by ſpeaking the wordes twyſe or thriſe ouer, and for to worke it truely doe this: firſt lette downe your logge handſomely into the water, and then lette the lyne be marked according vnto the Shippe, a two or thrée fadame from the logge accordingly, that it be ſo farre a ſterne that it commeth in to quicke water, that the edie of the ſterne doth not ſtaye it, and that done, then beginne to ſpeake your wordes, and ſo ſtayed at iuſt the ende of the wordes, and then hale in your logge againe and meaſure howe many fote or fadames that you haue vered or put out in that tyme, and ſuppoſe that your portion of tyme is a.120.part of an houre, more or leſſe it maketh no matter, ſo that you doe know the iuſt portion of tyme.

An Engliſh leage 2500. fadame. A ſpaniſh league. 2857. fadame.

Additiõs

And ſuppoſe that you haue vered fiue and twentie fadames, in the hundreth and twenty part of an houre, therefore multiply a hundreth and twenty by fiue and twenty, and of that multiplication ther commeth. 3000

fadame

Additiõs

fadame and now an Englishe league is.2500.fadame, so that the shippe hath gone one league ꝛ.500.fadames in an houre, and the sayde.500.fadomes is the fifth part of a league, so that the shippe hath gone one league and one fifth part of a league in an houre. And this by multiplying the porcion of tyme by the number of fadams you may kæpe a very good reconing of your ships way, hauing this consideration, that you doe make as often tymes prowfe as the wynde doth encrease or decrease.

And for a good order in the kéeping your account, doe this: Loke how long tyme that ẏ wynde hath blowne stedely without any increasing or decresing or altering of your cource, then when that you doe sée what or how many fadames that the shippe hath gone in one houre, then multiply it vnto so many houres as the ship hath gone so much by, and then deuide all that sũme by.2500 or else it is better to adde all your number of fadames as longe as the shippe hath gone one cource without altering: as for ensample this. The ship hath gone.4. houres.25.fadome, in the tyme of.120.part of an houre, that is in foure houres. 12000. fadome and the wynde encreasing, she went thrée houres.34.fadams. In.120. part of an houre, that is in thrée houres.12240.fadams, and the wynde decreasing, the shippe went fiue houres but.16.fadams, in the.120.part of an houre, ẏ is.9600. fadame in fiue houres, now adde all these numbers of fadams to-gether, that is.12000.and.12240.and.9600. and all these make.33840. So that the shippe hath gon in.12.houres.33840.fadames, ꝛ now deuide this sũme by.2500.which is a league, and then there will stande 13.in the quantitie lyne, and.1340. remaineth ouer. So that you may conclude, that the shippe hath gone.13. leagues and a halfe, and.90.fadames: and by this order you may kæpe a very good order in your reconing, and so note it in your Booke, and make a marke in your

Cart.

Cart. &c. And this is to be noted, that a Spanish or Portugale league doth containe. 2857. fadames, & an English league but. 2500. fadames.

¶ The. 15. Chapter or rule, treateth of the Longitude, &c.

NOw some ther be that be very inquisitiue to haue a way to get the lõgitude, but that is to tedious for Sea men, for that it requireth the deepe knowledge of Astronomie. For this they must consider, that the whole frame of the firmament is caryed round from the East to the West, in. 24 houres, so as there remaineth neither light nor marke, but goeth rounde, sauing onely the two Poles of the world, and these two stande alwayes fast. But (as I sayde before in the ninth rule) of him that going South or North, doth rayse or lay the Pole, and in lyke case the Equinoctial altering his Paralel, and causing the light of the Firmament to alter the tyme of their shining or abyding aboue our Horizon: so he that goeth directly East or West, doeth neither rayse nor lay the Pole, so that still the lyghts of ỹ firmament doth make one manner of arch according to their Latitude or declination: but the going East or West doth alter the Meridian, causing the Planets to haue their aspects at another houre or tyme, altering the tyme of the changes of the Mone, & also the tyme of the Eclipses: which is necessary for all trauailers by sea or by lande. Therfore I thought it nedefull to be spoken off: for as coũtries haue Latitude from the Pole, so in like manner they haue appointed Longitude. Now therefore you may get the Latitude with instruments, but the Lon-

Altering the time of rising & setting of the lights.

Altering ỹ aspects.

Of Latitude and Lõgitude

gitude you must bring from another place, which you can-not doe but with a Globe or else a mappe or carde, and then you must measure from the Meridian of the Canarie Ilands, otherwise called the fortunate Ilãds. And in our latitude of London, euery.555.myles which cõteyneth.15.degrees, will answere to one houre of time: and vnder the Equinoctial.900.miles to.15.degrees: the degrees be as long as ỹ degrees of latitude, but towards the Pole fewer and fewer, till they come to nothing vnder the two poles. And now.37.miles with vs at London, will answere to one degree of our Latitude, at.51. or.52.degrees of eleuation of the Pole, but ỹ cause why the Longitude was fetched from the Canarie Ilands, I know not, but it was as I suppose, bicause it was then the Westermost place then knowne: For Ptholomeus was the first that ordeyned that rule.

15.degres is an houre of time and at Lõdon it is 555.miles

Lõgitude begineth at ỹ Canary Ilands.

Now furthermore, bicause you shall know the better, I haue drawne out in my seconde booke, called the Treasure for trauailers, certaine principall places in the whole world, both their Longitude and Latitude, by which you shall know what manner of Arch the Sun with the other lights doth make, and also by the Longitude you may know at what tyme the Moone with any of the Planets doth make any aspect. Besides this, the Eclipses of the Sunne or Moone, with the change, quarters, and full Moone, by a true and exact Ephemerides, through all places, to know the very true houre & minute of time of the Diameter: considering for what Longitude or place your Almanacke was made. And now to get the Longitude, you may do it at the time of the Eclipse of the Moone, for that the Eclipses of the Moone be generall, so that she being aboue your Horizon in any place vpon the superficial parts of the earth, or Sea, considering (as I sayd before) by your Almanacke, at that tyme when the Eclipse should happen,

To know the true time of ỹ aspects of ỹ Moone

the

the very houre and minute, knowing also the place that your Almanacke was made for: that done accordinge to this rule, with a precise instrument you shall take the alteration of the tyme with the houre and minute of the Eclipse. And furthermore you might know your Longitude with the Ephemerides, by the coniunction of the Mone with other fired starres, if it were not for one great infirmitie, & that is the paraler of the Mone, which the Semidiameter of the earth doeth cause, by nearenesse of the Mone vnto the earth: wherefore I would not any Seamen should be of that opinion that they might get any Longitude with instruments. Therefore let no Seamen trouble themselues with any such rule, but (according to their accustomed manner) let them kepe a perfect accompt and reckening of the way of their shippe, whether the shippe goeth to leewards, or maketh hir way good, considering alwayes what things be against them or with them: as tides, currents, windes, or such lyke.

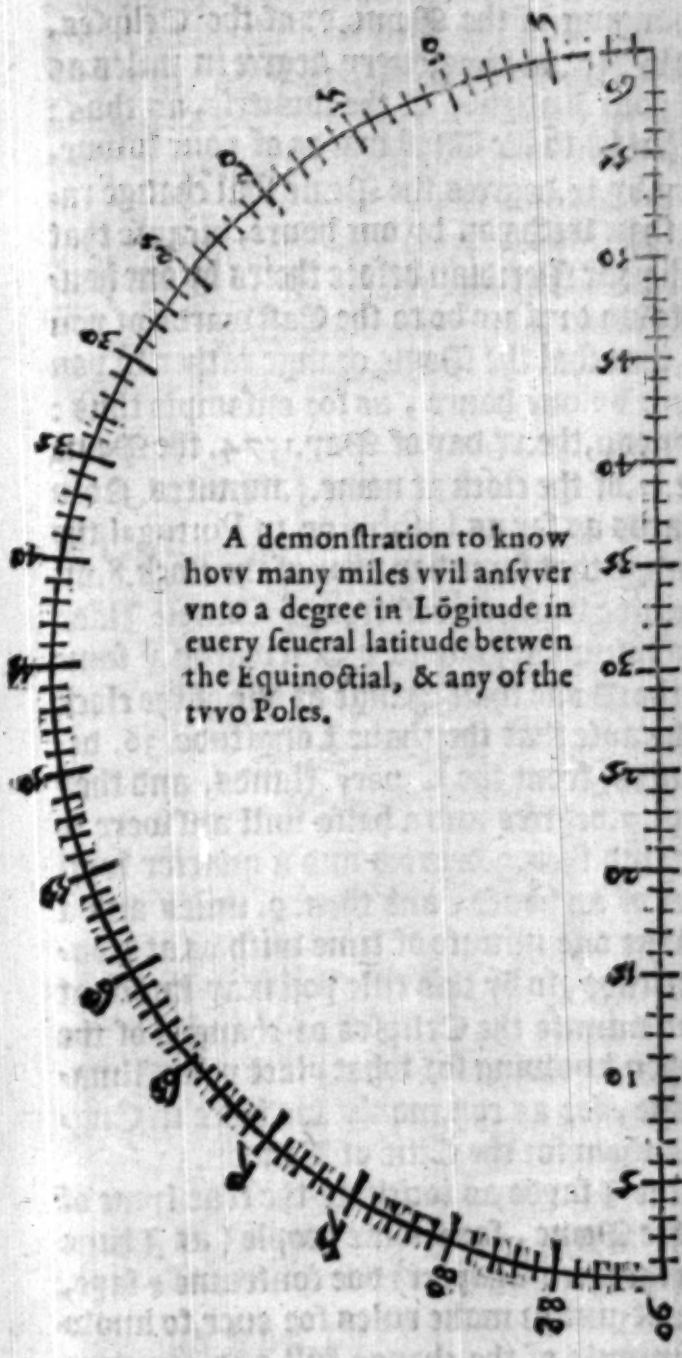
The Longitude is not to be gotten wt̄ instrumēnts on the sea.

¶ The. xvj. Chapter sheweth how many miles wil answere to one degree of Longitude, in euery seueral Latitude, betwene the Equinoctial and any of the two Poles: with the demonstration for that purpose: & the diuersities of aspects of the Moone.

NOW by this rule shall I teach you how many myles will answere to one degree, for euery seuerall Latitude to any of the two Poles, either artick or antartick. And first, vnder the Equinoctiall (the two Poles being euen with the Horizon) 60. miles do answere to one degree, as I sayde in the. 15. Chapter.

And now shall follow the rest. Where the Poles be rayſed. 21. degrées. 56. miles belongeth to one degrée of Longitude. Now the Poles being rayſed. 29. degrées. 52 miles doe anſwere to one degrée. The Poles being raiſaed. 36. degrées. 48. miles doe anſwere to one degrée. The Poles. 42. degrées raiſed. 44. miles goeth to one degrée of Longitude. The Pole rayſed. 48. degrées. 40. myles to one degrée. The Pole rayſed. 53. degrées. 36. myles to one degrée. The pole raiſed. 57. degrées. 32. miles to one degrée. The Pole rayſed. 62. degrées. 28. miles to one degrée. The Pole rayſed. 66. degrées. 24. miles to one degrée. The Pole rayſed. 70. degrées. 20. miles to one degrée. The Pole rayſed. 74. degrées. 16. miles to one degrée. The Pole raiſed. 78. degrées. 12. miles to one degrée. The Pole rayſed. 82. degrées. 8. miles to one degrée. The Pole raiſed 86. degrées. 4. miles to one degrée. The Pole being raiſed to the higheſt at. 90. degrées (being then your Zenith) there all the Meridians méete. And now shal follow a demonſtration of halfe a Circle, that shall ſhew you how many myles will make a degrée, according vnto euery Latitude that you are in, by the replying of a payre of Compaſſes or a thréed made faſt at the lower corner, at. 90. and there in like manner at one of the points of the Compaſſes, and the other point vnto the Latitude, that you are in, for all circles is according vnto their Diameters.

For



A demonſtration to know howv many miles vvil anſvver vnto a degree in Lõgitude in euery ſeueral latitude betwen the Equinoctial, & any of the tvvo Poles.

For in the halfe circle is marked the eleuation of the Pole: in the line of diameter or right line, is marked ỹ miles anſwering euery degrée: and to know how many miles wil anſwere vnto one degrée, firſt open your compaſſes or elſe lãye the thread vnto the eleuation of the Pole ỹ you doe require the nũber of miles vnto, one degrée: & then ỹ iuſt lẽgth of the thread being marked, lay the thread vntœ the line of Diameter, or right line, which is ỹ line of miles, & then you ſhal ſée at that place is the number of miles vnto one degrée.

degrée, &c. Now you must consider that euery houre of time in the changing of the Mone or of the Eclipses, you must allow .15. degrées, euery degrée in miles as you doe sée in your Latitude of the countrie, as thus: those places that be to the Westwards of your towne, place, or coũtry, by .15. degrées, the Mone shal change rather with thẽ than with you by one houre, bicause that they shal touch your Meridian before theirs by one houre. And if the town or place be to the Eastwards of you by .15. degrées, then shal the Mone change rather wỏ you than with them by one houre, as for ensample thus: with vs at London, the .11. day of May .1574. the Mone shal change at .12. of the clock at none .5. minutes. Now to the westwards as far as Lisshburne in Portugal, the Mone shal change that same day at .11. of the clock .8. minutes, ỹ Longitude being theroff from ỹ Canarie Ilãds fiue degrées .36. minutes. Now to ỹ Eastwards, ỹ same day at Rome, the Mone shall change at one of the clock 12. minutes, bicause that they haue Longitude .36. degrées .40. minutes, from the Canary Ilands, and then by this accompt .7. degrées and a halfe will answere to halfe an houre, and then .3. degrées and a quarter wyll make a quarter of an houre, and then .9. miles and a quarter wil make one minute of time with vs at London in our Latitude, so by this rule you may know at what time and minute the Eclipses or changes of the Mone doe happen, knowing for what place your Almanacke was made, for as commonly we hére in Englande doe make them for the Citie of London.

15. Degrees answereth vnto an houre of time.

Thus much haue I sayde as touching the true tyme of the change of the Mone, for ỹ some people (as I haue sayde before in the third Chapter) doe contemne & saye, why doe they not giue or make rules for euer, to know the houre and minute of the change, full, and quarters of the Mone? And yet they be vtterly voyde of any

To know the true time of ỹ change & quarters

know-

knowledge in the Mathematicall Science, wherby they might know the true time of the change of the Mone: For it is a question Astronomical, to know the Mones motion: a question Geometricall, to knowe the true time of the aspects, or measure betwene the Sunne and the Mone: and thirdly, it is a question Cosmographical, to know the true Longitude of the place he is in, at the time when the Mone changeth, &c.

of the Moone is a questiō Astronomical, Geometrical and Cosmografical.

Now followeth the next rule which shall treate of Longitude and Latitude.

¶ The seuenteenth Chapter sheweth the Circumference of the whole Earth and the Sea, vnder sundry Paralels, whereby that any Sea-man may know what quantitie or part of the earth that he hath sayled or passed by the number of leagues, and also he may know the alteration of time, &c.

AND nowe furthermore I doe thincke it not hurtfull but necessary for to shew the circumference of the whole Earthe, at sundry Latitudes from the equinoctial, whereby in their sayling that they may know what quātitie or part of the whole Earth that they haue passed or gonne, and also what that the diuersitie, aspect, or time that they haue altered themselues from any place assigned, which is very necessary for thē ỳ should go of any longe voiage

Additiōs

voiage as this, vnder the Equinoctiall the whole earth is in circumferẽce.7200.leagues, and the halfe thereoff is in that place as where his mone is mydnight is kẽping that paralel is.3600.leagues, and the quarter of the compaſſe is.1800.leagues, and ther the diuerſitie of tyme is altered.6.houres, and then in.900. leagues the time is altered thrée houres: ſo that in ẏ ſayling Eaſt or Weſt vnder the Equinoctiall.300. leagues, ſhall alter one houre of tyme in the eclipſes or the changes of the Mone.&c.

And now farthermore, where the Pole is rayſed.20 degrées aboue the Horizon and to go round about the earth kẽping the paralel, the whole compaſſe is. 6766. leagues, and the halfe of it is.3383. leagues, and there your mone is mydnight, and then a quarter of that is 1691.leagues and a halfe, & there the alteration of time is.6.houres, and then.846.leagues doth alter thrée houres of tyme, ſo that. 282. leagues doth alter one houre in the change or eclipſes of the Mone, &c. And now in the Latitude of. 30. degrées from the Equinoctiall the compaſſe of the earth vnder ẏ paralel is.6236. leagues, and the oppoſit part in that paralel is.3118.leagues, & there mone is midnight, and then the quarter of the compaſſe of the earth is.1559.leagues, and then paſſing in that paralel.779.leagues and a halfe, doth alter thrée houres of time: ſo that.260.leagues ſhall alter one houre in the aſpects of the Mone, and alſo in the Latitude of.40.degrées from the equinoctial, the whole compaſſe of the Earth and Sea vnder that paralel, is.5516. leagues: So the halfe is.2758.leagues, & a quarter is.1379. leagues, ſo that.689.leagues and a halfe, ſhal alter thrée houres of tyme, and 230. leagues, will alter one houre of tyme in the Eclipſes or aſpects of the Mone, &c.

And now where the Pole is rayſed.50.degrées, ther the Circumference of the whole earth vnder the paralel

is

is.4628.leagues,and the halfe theroff is.2314.leagues, and the quarter thereoff is.1157. leagues: so that.578. leagues and a halfe,doth alter three houres of tyme,so that.193. leagues doth alter one houre of tyme in that paralel. And now in the Latitude of.60. degrees from the Equinoctial in that paralel it is but.3600.leagues, to go round abut the whole earth & Sea,so that.1800. leagues is the opposite part of that paralel, and there your none is mydnight, so that.900.leagues shal alter fyre houres of tyme, and.450. leagues,three houres of tyme,and.150.leagues shal alter one houre of tyme, in the aspects of the Mone being the.24. part of the compasse of the earth,in that paralel.&c.

And now where that the Pole is rayfed.65.degrees, there the circumference in the paralel is.3042.leagues, so ỳ the halfe is.1521.leagues, & a quarter of that paralel is but.760.leagues & a halfe: So that.380.leagues shall alter three houres of time,and.126.leagues & three quarters,shall alter one houre of tyme.&c. And also in the Latitude of.70.degrees,the compasse of the earth is in the paralel.2462.leagues, so that the opposit part is 1231. leagues, and the quarter is. 616. leagues and a halfe,so that.307.leagues and three quarters doth alter three houres of tyme & .102.leagues, will alter one houre in the Eclipses or change of the Mone. And furthermore in the Altitude of the Pole.75.degrees, ther the compasse of the earth in that Paralel, is.1864.leagues,and the halfe is.932. leagues, and the quarter is 466.leagues,so that the alteration of.3.houres of time is.233.leagues,and.77.leagues,and two myle wil alter an houre of time.&c. And also in the latitude of.80. degrees from the Equinoctiall, there the whole circumference of the earth vnder that paralel is but.1250.leagues & the opposit part in that Paralel,is.625. leagues, and then the quarter of that is but. 312. leagues and a

halfe, so that. 156. Leagues will alter. 3. houres of tyme, and. 52. leagues will alter one houre, in the tyme of any Eclipse or any aspects of the Mone, so that you may see how short that the Circumference of the earth is at the Latitude of. 80. degrées, and this I do cease to shew any further towards the Poles-wards, for that it is doutfull whether that it is Nauigable vnto, so neare the Poles. &c.

¶ The eighteenth Chapter or rule, sheweth how to sayle by the Globe.

NOw to sayle by the Globe, it is conuenient to be spoken off: For that generally the most part of the Sea-men make their account as though the earth were a platforme. For they do not consider that the Earthe is a Globe, and that the Meridians doe grow narrower and narrower towardes the two Poles, for it is vnpossible to draw the face of the earth & the Sea true vpon a platforme, for if you will discribe the land true, then shall not the Sea be true, for as you goe towards the North parts, your Meridians growe togither, as as your lynes or points be according to the Arte of Hydrography, for the Sea shall be broader to the North parts than it is.

You cannot draw the land & sea true vpon a flat thing.

Now & if you would describe the Sea true, with lines, courses, distances, hauens, & daungers, then should your lande be broader to the North parts than it is. As for ensample, thus: England and Scotland being both one Ilande, in all your Cardes of Nauigation, that doth shew any part to the Southwards, the North part of Scotland is drawen much bigger than it is, for otherwise the lines of South and North should not be according

To make a Sea plat or Carde.

to

to the trentyng of the land, for if you viewe it well, you shall finde the Northe ende of Scotland much more in distance than it is. As you may see in measuring it by the trunke of your carde there.

For your better understanding, I haue shewed the compasse of the earth vnder sundry Latitudes, in the Chapter going before, and by that you may see that the compasse of the East and West lyne (comming from the Equinoctiall) is much lesser to the Northwardes, than it is to the Southwards. Wherfore whē you shall haue any occasion to attempt any voyage to the Northe parts, it is best to sayle by a Globe: for so shal you better see the distances and bignesse of the landes, and in lyke manner your lines and courses. In this order, first (according to the accustomed manner) keepe a perfect account and reckening of the way of the ship, by what lyne or poynt your shippe hath made hir way good, thē must you resort to your Globe. After that cōsider what place and paralel you be in, which you may doe by the Sunne by day, & by the starres by night. Now (knowing what place and paralel you be in) set your Globe to the eleuation of your Pole: ỳ done, turne to the place of Your Zenith, and seeke the opposite of it in your paralel: for then you know that in the same paralel is your East and West lyne: that had, the iust quarter of that circle to the Pole, must be deuided into the eight points of your compasse, doing so likewise on the other side.

Howe to vse ỳ globe to direct your course, & to knowe howe that any place doth bear

In like case if you come to the Southwards, deuide your .8. wynds from your Antarticke Pole, to your paralel circle: and thus must you doe euer and anon, for the oftner you doe obserue this custome, the better and perfecter shal your course be. Now thus briefly I make an ende of the sayling by the Globe. But for them ỳ do occupy ỳ Southparts, nothing is better thā their cards.

Bicause I haue declared vnto you the length of certain of the paralels, what leagues the earth doth containe in compasse vnder them, now will I shew you how many leagues distance there is from one paralel vnto an other, accordingly as I haue set downe in the Chapter next going before this, as I do shew the Circumference first vnder the Equinoctial, and then in the Latitude of 20. degrées, and then. 30. degrées. &c. And first from the Equinoctial vnto the Latitude of. 20. degrées is. 400. leagues, and from. 20. degrées vnto. 30. degrées in Latitude, is. 200. leagues. The lyke is from. 30. vnto. 40. degrées, and from. 40. to. 50. and from. 50. to. 60. So that there is from the Latitude of. 60. degrées vnto the equinoctial. 1200. leagues, and there a degrée of Longitude is but halfe so much as it is vnder the Equinoctial, and the whole circumference of the earth but halfe so much in like manner, and also from the Latitude of. 60. degrées vnto the Pole, is but. 600. leagues, and there all the Meridians doth méete: and it is from the Equinoctial vnto either of the .2. Poles of the world. 1800. leagues. &c. Which is the fourth part of the compasse of the whole Earth.

The cause vvhy that you may see ỹ sailes of a ship and not ỹ hold.

Furthermore, for that you may the better vnderstande that the Earth is a Globe or Circular (which any person that doth occupy the Sea, séeth most apparantly) you shall perceiue it thus, if you sée a shippe any thing farre off, you may perfectly sée the sayles of it, but not the hold, the cause whereoff is the circularnesse of the earth, and the water of the Sea: for that the water doth ryse and swel betwéene you & the other shippe, according to the distance betwéene both the shippes: bicause the distance to the Center of the Earth or water is in euery place alike. And he that hath desire to know further hereoff, M. Dee hath made mencion thereoff in Euclides Elements, in his Mathematical preface, & also

in

in the.12.booke, whither you may haue recourse, yet notwithstanding I will say a little thereoff, whereby you may discerne how far it is possible to see a shippe vpon the Sea: as thus: if you be on the Sea in a shippe, so that there be but halfe a league betweene you and the other shippe, the water will be fiue ynches and a halfe higher in the myddle of the way betwene both the ships, for that the water is equall in euery place vnto the center of the earth, and then the water going by a croked lyne, then to strike it by a right lyne, the middlemost lyne that should come from the center of the earth, shal be shorter than the other two lines comming from the center of the Earth betwene the two shippes by fiue ynches and a halfe, and then it must nedes be sayde, that the water is higher by the sayd fiue ynches and a halfe. And furthermore, if the two shippes were a league asunder, then the water by his circulernesse should be.22.ynches higher than the leuell in the middle betweene both the shippes.

To knowe how many foote & ynches that the water is higher than the Leuell or the Sea, betwene two ships

Furthermore, if the two shippes be two leagues asunder, then the water shall be higher than the leuell in the middle betweene both the shippes, by.88. ynches, which is.7.foote and.4.ynches. If the two shippes be.3. leagues the one from the other, then the water shal be higher than the leuel in the mydway betwene both the shippes, by.198.ynches, which is.16.foote and a halfe.

Furthermore, if the two shippes be.4.leagues asunder, the water shall be higher than the leuel in the midway betwene both the shippes, by.252.ynches, which is 29.foote, and.4.ynches. And furthermore, if the.2. ships were fiue leagues asunder, the water should be higher than the leuel of the midway betweene both the ships, by.550.ynches, which is.46. foote lacking.2.ynches. Yet furthermore if the two shippes were. 6. leagues asunder, the water should be higher thã the leuell in the mid-

dle way betwéene them by. 792. ynches, which is. 66. fote. Furthermoze alſo, if the. 2. ſhippes were. 7. leagues aſunder, the water ſhould be higher than the leuel in the midway betwéene both the ſhips by. 1878. ynches, and ỹ is. 90. fote, which is as farre and rather farther than it is poſſible to ſée any ſhip vpon the Sea: Neither is it poſſible to ſée any land further, but ſuch land as is very high lande, which foz the greatneſſe of the height you may ſée it, wherefoze. 6. leagues oz. 7. leagues is called a ken. Now the circularneſſe of the earth is the cauſe that you may ſée a ſhippe oz land further out of the top, than vpon the hatches: Wherefoze it is a plaine caſe, that the earth and Sea is not flat, but circular, as is afoze declared, &c.

What a ken is and the cauſe vvhy you may ſee a ſhip farther out of ỹ top, thā vpon ỹ hatches.

¶ The. 19. Chapter, is as touching the making of Plats oz Cardes for the Sea, and not to paint their cardes as they doe, but rather to ſupply the vacant places with other neceſſary matters: and alſo of three neceſſary things contained in the Plats or Cardes, and their vſes, which is the moſt neceſſary thing in Nauigation.

FOR the making of plats oz cardes, as touching Hydrographia, commonly called Sea cardes, I meane to ſay little thereoff: foz that it is ſufficiently declared in the booke called the Art of Nauigation: Sauing this, I would wiſh them that be makers of plats and cardes foz the Sea, not to paint their compaſſes with ſo many colours: neither vpon the lande with ſo many flagges, foz that it doth rather hurt than good: although it may be ſayd, they be ſo painted in vacant

Not to paint their Sea cardes but to vſe

rant places, thole vacant places I would wish them to furnish with these two matters in this order. First, in some vacant place with a Compasse there, to place against euery point of the halfe of the compasse, letters, or some other figures or Carecters, thē in lyke manner, (according to that place where such a Mone maketh a full Sea) to make that letter or Carecter at the hauen, port, or place: As for enlample thus: I place. A. at the East point. B. at the East and by South. C. at the East Southeast. D. at Southeast and by East, and so consequently to all the points vnto the West, then that being done, where it floweth an East Mone, I place. A. in the plat or carde, and where an East and by South Mone, I do plare. B. in the carde, and so forth, according to the place of the Mone that maketh a full Sea. And where it runneth halfe tyde vnder other, to make some note vpon the carde in that place. &c.

the vacāt places wᵗ other necessarye matters.

This also is very necessary to be done, to furnish vp all the vacant places of the plat or Carde, to draw the shape or fashion of euery head land or high land alongst euery coast that is nedefull to be knowne, and at what point of the compasse the land is of that fashion: at how farre off the land ryseth in that fashion: and so to make the fashion of the lande as often as the land altereth the forme and fashion: and last of all, at what point of the Compasse the land hath that shape or fashion: for being vpon one side, the lande ryseth of one fashion, and on the other side, of an other forme or fashion.

To draw the shape of ỹ land in their Cardes.

Also being neare the lande, it will be in one fashion, and being farre off in another fashion (as is before declared in the. 14. Chapter) for there is nothing more nēdefull & necessary for a Sea-man, than this: to know the land when he sēth it, and there is no way better, to make him remēber it, thā to haue notes how ỹ lād doth ryse vpon euery side, and what greater inconuenience

may

Great infirmities by mistaking any place.

may there growe by any meanes, than there may by mistaking of a place: for it were twenty tymes better to be throughly perswaded, that he knoweth it not, thā to thinke he doth know it, not being that place. For whereas he doth thinke to preuent the dangers, he may willingly runne vpon the dangers, not knowen of him. Therefore in my opinion, they can doe no better than to furnish their vacant places in their plats and cardes with this matter: for there can be nothing better. The vse of the Sea cardes is most necessary for Nauigation for long voyages: first, for that it sheweth you how one place beareth from another: secondly, the distance of any places how farre the one is from the other. Of which the one is represented by the lines of the compasse: the other by the scale or trunke of measure, if the platte be truely made. Thirdly, it sheweth you in what Latitude from the Equinoctiall or Altitude of the Pole any place is in, by the line of degrees.

Hovv necessary a thing the Sea cards be.

3. necessary thinges in the sea Cardes.

Now to direct your course through the Sea by the carde, to any place assigned, you must first loke by what point of the compasse it beareth from you, from ỹ place you meane to sette off from the land, vnto the place you would first fall with. Which you shall know thus: seeke a lyne from the nert compasse vnto the place you meane to depart from, then open your compasses vnto one of those lynes by your iudgement that falleth neare vnto your place assigned: and let the other foote of your compasses stand iust at that place where your ship is, when you direct your course: that done, beare your hands forwardes euen, and let the one ende be still vpon the line to the which you did open your compasses, vntill you come to your place assigned. But if it falleth short of the place assigned, then take the nert lyne nearer vnto the place you departed from: when you haue so done, if your compasses doe ouer-reach the place assigned, then take a

To knovv hovv any place doth beare frō you by ỹ Carde.

lyne

lyne further off from the place you doe meane to set off from: and so shal you see by what point of the compasse the place assigned doth beare frō you. &c. If you would know how farre the place assigned is from you, set the one foote of the compasses vpon the place you depart frō, & stretch out the other foote vnto the place assigned iust, that done (standing stil vnremoued) set thē to the scale or trunke of measure, and that wil shew you iustly how many leagues it is iust from the place of your departing vnto the place assigned. If the distance betwene the two places be more than the compasses will reach at once, then first set your compasses vnto the scale, opening the compasses vnto. 100. leagues more or lesse, as your scale and cōpasses wil giue you leaue at your discretion, after that set the one foote at the place of your departing, and the other foote of the compasses right towards the place assigned, as often tymes as the distāce betweene the two places doth require, and then (the compasses being opened vnto. 100. leagues) you may conclude it to be so many. 100. leagues vnto the place assigned, as the compasses did shewe vnto you: but if there be any odde measure, then open your compasses to that quantitie, and set that to the scale, and it will shew you the iust content of that measure, more than so many. 100. leagues. &c. Furthermore touching the third commoditie, which is to know what latitude any place assigned hath: sette one foote of the compasses vpon the place assigned, and open the compasses vnto the nert East and West Line, then carye that vnto the line of degrees keeping the foote of the compasses vpon the East and West lyne) it will shew iustly the number of degrees that the Pole is aboue the Horizon. So of these three wayes, by the first is knowne by what point of the compasse any place beareth from you. By the second is knowne how farre distance it is vnto any place

To knowv hovv far it is vnto any place by ỹ card.

To know vvhat Latitude or height of the Pole any place hath by ỹ Card.

assigned. And by the third is knowne in what heigth the Pole is, in any place assigned. &c. (Now this being knowne) you may with the more ease know how to attaine to come vnto the port or place assigned.

Yet furthermore there is to be considered in (directing the course of a ship to any place assigned) what impediments may be by the way: as tydes, currents, or the scantnesse of the wynde, which may put the shippe vnto the læwards of his course, as also the surging of the Sea: And all this must be considered by the maister & Pilot of the ship. Likewise also in long voyages, the winde may often shift vpon him, & sometyme the winde may be such as he cannot lye his course: wherefore he must kéepe a perfect account of the shippes waye, and cõsider to know what point the ship hath made his way good by. And at euery time that the winde doth shift, and the ship cannot lye his course, to note in ỳ carde or plat in what place the ship may be: in hauing a speciall regarde vnto the way of the ship, as touching the swiftnesse or slownesse that the shippe goeth: and if so be the weather be cleare eyther by night or day, to take ỳ true Altitude of the Pole: for by that they may correct the ships waye, and giue a very neare gesse, how the place (assigned to goe vnto) doth beare from them, as also how farre it is thether, sauing onely in the East and West course: & then they haue no other helpe but onely the very account of the shippes way.

Things to be considered by the M. or Pilot of a shippe.

They may correcte the shippes way by ỳ taking the height of the Pole.

And to correct their dead reckening by the altitude of the Pole, they must doe this: (especially if the shippe haue hadde often trauarse by the meanes of contrary wyndes, so that she could not lye his course,) consider vpon the carde or plat how long the ship hath made his way good for so many points as the ship hath sayled by: then (if by the Altitude of the Pole the shippe hath gon more than the dead reckening did shew you) repaire vn-

to

to the line of degrées, and set the one foote of the Compasses vpon the degrée & place of the height of the Pole, and the other vpon the next East and West lyne: that done, beare it vnto the place you suppose the ship to be in: and then bring forwards with the other compasses, what point of the compasse the shippe hath sayled by, and at the méeting of the two payre of compasses, make a note for the place that the shippe is in: from which place you may with your compasses sée, how the place assigned doth beare, and also how farre off you be from the same.

Furthermore (if you finde by the height of the Pole that you are not so farre shot as your reckening dyd shew vnto you) you must pull backe so much from the point that the Shippe hath sayled by, as the height of the Pole doeth shew vnto you, by the order before rehearsed. &c.

Furthermore (as I haue declared vnto you in the 14. Chapter going before) to know how farre the land is off from you, knowing (as before) the distance betwene any two places, by setting the lande with your compasse, you may doe the lyke by your carde, as thus: you setting the two places with your cõpasse, doe know that the two places be so many leagues asunder, then shall you repayre to the carde, and according to the bearing of the two places by the points of the compas, you (being thwart of one of these two places) shall replye it with your compasses vnto your scale: But for that in the scale the leagues be so small, you may assigne twenty leagues to be but one league, & open the compasses vnto that proportion that the two places be asunder, and the one of them doth beare from the other: that done, open the Compasses againe from the center of the compasse, vnto the place that you owe imagine to

To know how far that the land is off from you by the sight of the lande with your Cõpasse, to do it vpon the land.

be the land, & then reply it vnto the trunke of measure, and you shall see how many leagues you be from the shoare, and so forth. So that you may see that the plat or carde is one of the necessariest things that is to be vsed, in Nauigation. &c.

¶ The. 20. Chapter is of the Longitude and declination of. 32. notable fixed starres, very necessary for Nauigation, with tables of their shining, and at what point of your Compasse they do both ryse and set: and also Tables for euery moneth of the yeare, declaring at what houre and minute they be South, running from the first day of the moneth, to the. 15. & from the. 15. to the last day, & wil continue these. 100. yeares without much errour.

AND furthermore, I doe thinke it conuenient for diuers considerations, to shew the Longitude and declination of certain of the most notablest fired stars that are neare vnto the Equinoctial, to the number of. 32. of thē, which are very necessary for Nauigation in diuers respects, as this: if you be vnto the North parts where the North Pole is raysed more thā. 50. or. 60. degrees, then ỹ North starre is to high to be obserued or taken with the Crosse staffe (as I haue declared in the firt Chapter) & it may chaūce so that in the day the Sunne is not to be seene at noone, and then these starres may serue your turne.

If ỹ Pole be raysed more thā 50. or. 60 degrees, it is to hie to be obserued by the crosse staffe.

And furthermore they be very good for them ỹ haue occasion to trauaile beyond the Equinoctial, where the

These stars vvil

North

Noꝛth Pole is vnder the hoꝛizon, in vsing their declination as they doe the Sunnes declination in all points, which doth appeare in the. 7. 8. and. 9. chapters of this booke. And furthermoꝛe they be very necessary foꝛ Seafaring men to know the houre of ỹ night, both by their being vpon the Meridian, and also by their rising and setting: you may know the true tyme of their rising & setting in euery Latitude by their declination from the equinoctial, whether they decline to the South parts, oꝛ Noꝛth parts, as is declared by ỹ declination of the Sun in the. 11. Chapter.

And furthermoꝛe by any of these Starres you may tꝛye the variation of your Compasse by night. &c. Now shall follow the Table of all these Starres. The first row of this table conteineth the names of the Starres. The second, the signes, what they be in Longitude. The third, the degrées in the Signes. The fourth, the minuts belonging thervnto. The fift, the degrées of declination. The sixt, the odde minutes belonging therevnto. The seuẽth sheweth towards what part they decline, by letters, of which. S. signifieth Septentrional, oꝛ Noꝛth declination. M. signifieth Meridionall, oꝛ South declination: as in the Table doth appeare. The eight doth shew nothing but the bignesse of the Starres. Now followeth the Table.

serue beyond the Equinoctial.

To knovv the rising & setting of these starres in all places, by the order of the xi. chapter

The order of the Table folovving.

A Table of the fixed Starres.

The names of the Starres.	Signes.	Longi. deg. mi	Declin. deg. mi		to what part they decline	bignes of ye Starres.
Whales backe.	Aries	6. 6	12. 11	M	second bignelle	
Whales belly.	Aries	16. 2	12. 20	M	second bignelle	
Rammes horne.	Aries	27. 42	17. 19	S	third bignelle.	
Rammes head.	Taurus	1. 46	21. 16	S	third bignelle	
Bulles eye.	Gemini	3. 42	15. 42	S	great Starres	
Orions left foote.	Gemini	10. 12	9. 14	M	a great Starre	
Orions left shoulder	Gemini	11. 26	4. 37	S	a Starre of the	
First Orions Gyrdle.	Gemini	16. 22	1. 19	M	second light both	
Orions right shoulder	Gemini	23. 6	6. 18	S	a great Starre	
Great Dogge.	Cancer	8. 40	15. 30	M	a very great starre	
Lesser Dogge.	Cancer	20. 10	6. 4	S	a great Starre	
Brightest in Hydra.	Leo	21. 2	4. 47	M	second bignelle	
Lyons necke.	Leo	23. 16	21. 59	S	second bignelle	
Lyons hart.	Leo	23. 32	14. 3	S	a great Starre	
Lyons backe.	Virgo	5. 16	22. 30	S	second bignelle	
Lyons tayle.	Virgo	15. 32	16. 46	S	a great Starre	
Rauens head.	Libra	5. 6	19. 53	M	of the third bignes	
Rauens wyng.	Libra	9. 36	17. 8	M	both those	
Virgins spike.	Libra	17. 42	4. 54	M	a great Starre	
Twirt Bootes thighs	Libra	18. 6	22. 9	S	a great Starre	
South Balance.	Scorpi.	9. 2	13. 44	M	second bignelle	
North balance.	Scorpi.	13. 12	7. 33	M	second bignelle	
Scorpions heart.	Sagit.	3. 42	24. 47	M	second bignelle	
Hercules head.	Sagit.	8. 42	15. 20	S	third bignelle	
Serpents head.	Sagit.	15. 52	14. 7	S	third bignelle	
The Eagle.	Capric.	24. 51	7. 28	S	second bignelle	
Dolphins taile.	Aqua.	8. 27	10. 1	S	third bignelle	
Goates taile.	Aqua.	17. 22	14. 13	M	third bignelle	
Water pourers leg.	Pisces.	2. 20	15. 52	M	third bignelle	
Pegasus shoulder.	Pisces.	17. 41	13. 1	S	second bignelle	
Pegasus leg.	Pisces.	23. 10	26. 30	S	second bignelle	
Whales tayle.	Pisces.	26. 21	21. 47	M	third bignelle	

The vſe of this Table is this: when you haue taken the height of any of theſe ſtarres vpon the Meridian, then loke what declination the ſtarre hath from the Equinoctial: if the ſtarre hath North declination, then ſubtract or take away the ſtarres declination from the height: if it haue South declination, then adde or put vnto the height, the ſtarres declination, & that wil ſhew vnto you the height of the Equinoctial, and then by the height of the Equinoctial, ỳ height of ỳ pole is knowne, as the .7. Chapter doth declare. And now I think it conuenient to make certaine Tables, to ſhew vnto you at what houre and tyme any of theſe ſtarres be vppon the Meridian, whereby they may the better knowe theſe Starres. I will alſo ſhew vnto you how long any of theſe ſtarres doe ſhine or tary aboue the horizon in this Latitude from the Equinoctial of London, that is at .51. or .52. degrees. And alſo at what point of the compaſſe any of theſe ſtarres doe ryſe or ſet, which will ſerue this 100. yeares without much errour.

How to vſe the ſtarres declination, to knowe the height of the Pole.

¶ A Table to know the ryſing and ſetting of theſe ſtarres, by what point of the compaſſe, and how many houres they be aboue our Horizon, the Pole being rayſed 51. or .52. degrees.

THE Whales back ryſeth Eaſt and by South, & vnto the Southwards: and ſhineth .10. houres & better.

The Whales belly (in a manner) as the whales back.

The Rammes horne riſeth Eaſt Northeaſt, and ſetteth Weſt Northweſt: and ſhineth .15. houres .16. minutes.

The Rammes head riſeth Eaſt Northeaſt, & ſetteth Weſt Northweſt: and ſhineth .16. houres .4. minutes.

The Bulles Eye riſeth neare the Eaſt Northeaſt, & ſetteth

setteth neare the West Northwest: and shineth.15.houres.2.minutes.

The Orions left foote riseth neare the East and by South, and setteth neare the West and by South: and shineth.10.houres and.6.minutes.

The Orions left shoulder ryseth East, and to the Northwardes, and setteth West & to the Northwards: and shyneth.12.houres.45.minutes.

The first in Orions girdle dothe ryse a lyttle to the Southwards of the East, & setteth a little to the Southwardes of the West: and shineth.11.houres.46.minuts.

Orions right shoulder ryseth East, & vnto ẏ Northwardes, and setteth West and vnto the Northwards: and shineth.13.houres.12.minutes.

The greate dogge ryseth East Southeast, & setteth West Southwest: and shineth.9.houres.

The lesser Dogge riseth East and vnto the Northwards, and setteth West, and vnto the Northwards: & shineth.13.houres.10.minutes.

The bryghtest in Hydra ryseth East and vnto the Southwardes, and setteth West and vnto the Southwardes: and shineth.11.houres.7.minutes.

The Lions necke riseth East Northeast, and to the Northwardes, & setteth West Northwest & to the Northwardes: and shineth.16.houres.16.minutes.

The Lions hart ryseth neare the East Northeast, & setteth neare the West Northwest: and shineth.14.houres.50.minutes.

The Lions backe riseth neare the Northeast and by East, and setteth neare the Northwest and by West: and shineth.16.houres.26.minutes.

The Lions tayle riseth neare the East Northeast, & setteth neare the West Northwest: and shineth.15.houres.12.minutes.

The Rauens head riseth neare the East Southeast,

and

and setteth nære the West southwest: and shineth .8. houres 12. minutes.

The Rauens wing riseth nære the East Southeast, and setteth nære the West Southwest, and shineth .8. houres 50. minutes.

The Virgins spike riseth East & to the southwards, and setteth West and to the Southwards and shineth 11. houres 4. minutes.

Betwæne Bootes thighes, riseth nære the Northeast and by East, and setteth nære the Northwest and by West, and shineth 16. houres 20. minutes.

The South Ballaunce riseth nære the East Southeast, and setteth nære the West Southwest: & shineth 9. houres 36. minutes.

The North Ballance riseth nære the East and by South, and setteth nære the west & by South and shineth. 10. houres 38. minutes.

The Scorpions heart riseth nære the Southeast, & by East, and setteth nære the Southwest and by West: and shineth. 7. houres. 5. minutes.

Hercules head riseth nære the East Northeast, and setteth nære the West Northwest: & shineth 14. houres 56. minutes.

The Serpents head riseth nære the East Northeast, & setteth nære ỳ West Northwest: & shineth 14. houres 40. minutes.

The Eagle riseth nære the East and by North, and setteth nære the West and by North: and shineth .13. houres 24. minutes.

The Dolphines tayle, riseth East and by North, and setteth West and by North: and shineth 15. houres 57. minutes.

The Goates tayle riseth nære ỳ East Southeast, & setteth west southwest: & shineth 9. houres 20 minutes.

The water pourers leg, riseth nære ỳ east southeast,

and ſetteth Weſt Southweſt: and ſhineth 8. houres 54. minutes.

The. 11. Chap. vvil ſhevve hovv long any of theſe ſtars vvil ſhine in all places.

Pegaſus ſhoulders riſeth nære the Eaſt Northeaſt, & ſetteth nære the Weſt Northweſt & ſhineth 14. houres 32. minutes.

Pegaſus leg riſeth nære Northeaſt and ſetteth nære Northweſt: and ſhineth 17. houres 6. minutes.

The Whales tayle riſeth Eaſt Southeaſt, & ſetteth Weſt Southweſt: and ſhineth 7. houres 48. minutes.

Furthermore if you deſire to know the time of any of theſe ſtarres, beeing aboue the Horizon in al latitudes, then repaire to the 11. Chapter, ſo you ſhall know it ther by their declinatiõ: euen by the ſame order that you know the Sunnes being aboue the Horizon, by the Sunnes declination.

	These ſtars being ſouth frō the firſt day of Ianuari vnto the 15.			Ianuar. frō the 15. to the laſt.			Februar. frō the 5. vnto the. 15.			Febru. frō the 15. to the laſt.		
1	Whales backe.	5.20	E	4.20	DA	1	3.20	DA	1	2.20	DA	
2	Whales belly.	5.54	E	4.54	DA	2	3.54	DA	2	2.54	DA	
3	Rammes horne.	6.28	E	5.28	E	3	4.28	DA	3	3.28	DA	
4	Rammes head.	6.45	E	5.45	E	4	4.45	DA	4	3.45	DA	
5	Bulles eye.	8.52	E	7.52	E	5	6.52	E	5	5.52	DA	
6	Orions left foote.	9.23	E	8.23	E	6	7.23	E	6	6.23	E	
7	Oriōs left ſhoulder.	9.28	E	8.28	E	7	7.28	E	7	6.28	E	
8	Firſt Orions girdle	9.50	E	8.50	E	8	7.50	E	8	6.50	E	
9	Orions right ſhoul.	10.12	E	9.12	E	9	8.12	E	9	7.12	E	
10	Great Dogge.	11.4	E	10.4	E	10	9.4	E	10	8.4	E	
11	Leſſer Dogge.	12.0		11.0	E	11	10.0	E	11	9.0	E	
12	Brighteſt in Hydra	12.4	M	11.4	E	12	10.4	E	12	9.4	E	
13	Lions necke	2.12	M	1.12	M	13	12.12	M	13	11.12	E	
14	Lyons hart.	2.13	M	1.13	M	14	12.13	M	14	11.13	E	
15	Lyons back.	3.0	M	2.0	M	15	1.0	M	15	12.0		
16	Lyons tayle.	3.42	M	2.42	M	16	1.42	M	16	12.42	M	
17	Rauens head.	5.2	M	4.2	M	17	3.2	M	17	2.2	M	
18	Rauens wyng.	5.19	M	4.19	M	18	3.19	M	18	2.19	M	
19	Virgins ſpike.	5.51	M	4.51	M	19	3.51	M	19	2.51	M	
20	twixt Boots thighs	5.56	M	4.56	M	20	3.56	M	20	2.56	M	
21	South Balance.	7.16	M	6.16	M	21	5.16	M	21	4.16	M	
22	North balance.	7.33	MD	6.33	M	22	5.33	M	22	4.33	M	
23	Scorpions heart	8.54	MD	7.54	MD	23	6.54	M	23	5.54	M	
24	Hercules head.	9.14	MD	8.14	MD	24	7.14	MD	24	6.14	M	
25	Serpents head.	9.41	MD	8.41	MD	25	7.41	MD	25	6.41	M	
26	The Eagle.	12.19	DA	11.19	MD	26	10.19	MD	26	9.19	MD	
27	Dolphins taile.	1.12	DA	12.12	DA	27	11.12	MD	27	10.12	MD	
28	Goates taile.	1.48	DA	12.48	DA	28	11.48	MD	28	10.48	MD	
29	water pourers leg.	2.48	DA	1.48	DA	29	12.48	DA	29	11.48	MD	
30	Pegaſus ſhoulder	3.47	DA	2.47	DA	30	1.47	DA	30	12.47	DA	
31	Pegaſus leg.	4.12	DA	3.12	DA	31	2.12	DA	31	1.12	DA	
32	Whales tayle.	4.24	DA	3.24	DA	32	2.24	DA	32	1.24	DA	

March frō the firſt to the.15.			March frō the 15.to the laſt.			April frō the firſt to the.15.			April frō the 15.to the laſt.			May frō the firſt to the.15		
1	1.20	DA	1	11.20	DA	1	11.20.	MD	1	10.20.	MD	1	9.20.	MD
2	1.54.	DA	2	12.54.	DA	2	11.54	MD	2	10.54	MD	2	9.54.	MD
3	2.28	DA	3	1.28	DA	3	12.28	DA	3	11.28.	MD	3	10.28.	MD
4	2.45.	DA	4	1.45.	DA	4	12.45.	DA	4	11.45	MD	4	10.45	MD
5	4.52.	DA	5	3.52	DA	5	2.52.	DA	5	1.52.	DA	5	12.52.	DA
6	5.23.	DA	16	4.23.	DA	6	3.23.	DA	6	2.23.	DA	6	1.23.	DA
7	5.28.	DA	7	4.28	DA	7	3.28	DA	7	2.28	DA	7	1.28.	DA
8	5.50.	DA	8	4.50	DA	8	3.50	DA	8	2.50.	DA	8	1.50	DA
9	6.12.	E	9	5.12.	DA	9	4.12.	DA	9	3.12.	DA	9	2.12.	DA
10	7.4.	E	10	6.4.	DA	10	5.4.	DA	10	4.4	DA	10	3.4.	DA
11	8.0	E	11	7.0	E	11	6.0.	DA	11	5.0.	DA	11	4.0.	DA
12	8.4	E	12	7.4	E	12	6.4.	DA	12	5.4	DA	12	4.4.	DA
13	10.12	E	13	9.12	E	13	8.12.	E	13	7.12.	DA	13	6.12.	DA
14	10.13	E	14	9.13.	E	14	8.13.	E	14	7.13.	DA	14	6.13.	DA
15	11.0.	E	15	10.0	E	15	9.0.	E	15	8.0.	E	15	7.0.	DA
16	11.42	E	16	10.42	E	16	9.42.	E	16	8.42.	E	16	7.42.	DA
17	1.2.	M	17	12.2.	M	17	11.2.	E	17	10.2.	E	17	9.2.	E
18	1.19	M	18	12.19	M	18	11.19.	E	18	10.19.	E	18	9.19.	E
19	1.51	M	19	12.51	M	19	11.51	E	19	10.51.	E	19	9.51.	E
20	1.56	M	20	12.56.	M	20	11.56.	E	20	10.56.	E	20	9.56.	E
21	3.16	M	21	2.16	M	21	1.16.	M	21	12.16	M	21	11.16.	E
22	3.33	M	22	2.33	M	22	1.33.	M	22	12.33.	M	22	11.33.	E
23	4.54	M	23	3.54.	M	23	2.54.	M	23	1.54	M	23	12.54.	M
24	5.14.	M	24	4.14	M	24	3.14.	M	24	2.14.	M	24	1.14.	M
25	5.41.	M	25	4.41	M	25	3.41.	M	25	2.41.	M	25	1.41	M
26	8.19.	MD	26	7.19.	MD	26	6.19.	MD	26	5.19.	MD	26	4.19	M
27	9.12.	MD	27	8.12.	MD	27	7.12.	MD	27	6.12.	MD	27	5.12.	MD
28	9.48.	MD	28	8.48	MD	28	7.48.	MD	28	6.48.	MD	28	5.48.	MD
29	10.48	MD	29	9.48.	MD	29	8.48.	MD	29	7.48.	MD	29	6.48.	MD
30	11.47	MD	30	10.47	MD	30	9.47.	MD	30	8.47.	MD	30	7.47.	MD
31	12.12.	DA	31	11.12	MD	31	10.12.	MD	31	9.12.	MD	31	8.12	MD
32	12.24	DA	32	11.24	MD	32	10.24	MD	32	9.24.	MD	32	8.24.	MD

May from the 15. to the laſt.			lune from the firſt to the. 15.			lune from the 15. to the laſt.			luly from the firſt to the. 15.			luly from the 15. to the laſt.		
1	8.20.	MD	1	7.20	MD	1	6.20	MD	1	5.20	MD	1	4.20	M
2	8.54	MD	2	7.54	MD	2	6.54	MD	2	5.54	MD	2	4.54	MD
3	9.28	MD	3	8.28	MD	3	7.28	MD	3	6.28.	MD	3	5.28	MD
4	9.45	MD	4	8.45	MD	4	7.45	MD	4	6.45	MD	4	5.45	MD
5	11.52	MD	5	10.52	MD	5	9.52	MD	5	8.52	MD	5	7.52	MD
6	12.23	DA	6	11.23	MD	6	10.23	MD	6	9.23	MD	6	8.23	MD
7	12.28.	DA	7	11.28	MD	7	10.28	MD	7	9.28	MD	7	8.28	MD
8	12.50	DA	8	11.50	MD	8	10.50	MD	8	9.50	MD	8	8.50.	MD
9	1.12	DA	9	12.12	DA	9	11.12	MD	9	10.12	MD	9	9.12	MD
10	2.4.	DA	10	1.4	DA	10	12.4	DA	10	11.4	MD	10	10.4	MD
11	3.0	DA	11	2.0	DA	11	1.0	DA	11	12.0		11	11.0	MD
12	3.4	DA	12	2.4.	DA	12	1.4	DA	12	12.4	DA	12	11.4	MD
13	5.12	DA	13	4.12	DA	13	3.12	DA	13	2.12	DA	13	1.12	DA
14	5.13	DA	14	4.13	DA	14	3.13	DA	14	2.13	DA	14	1.13	DA
15	6.0	DA	15	5.0	DA	15	4.0	DA	15	3.0	DA	15	2.0	DA
16	6.42	DA	16	5.42	DA	16	4.42	DA	16	3.42	DA	16	2.42	DA
17	8.2	DA	17	7.2	DA	17	6.2	DA	17	5.2	DA	17	4.2	DA
18	8.19	DA	18	7.19	DA	18	6.19	DA	18	5.19	DA	18	4.19	DA
19	8.51	DA	19	7.51	DA	19	6.51	DA	19	5.51	DA	19	4.51	DA
20	8.56	DA	20	7.56	DA	20	6.56	DA	20	5.56	DA	20	4.56	DA
21	10.16	E	21	9.16	DA	21	8.16	DA	21	7.16	DA	21	6.16	DA
22	10.33	E	22	9.33	DA	22	8.33	DA	22	7.33	DA	22	6.33	DA
23	11.54	E	23	10.54	E	23	9.54	DA	23	8.54	DA	23	7.54	DA
24	12.14	M	24	11.14	E	24	10.14	E	24	9.14	E	24	8.14	E
25	12.41	M	25	11.41	E	25	10.41	E	25	9.41	E	25	8.41	E
26	3.19	M	26	2.19	M	26	1.19	M	26	12.19	M	26	11.19	E
27	4.12	MD	27	3.12	M	27	2.12	M	27	1.12	M	27	12.12	M
28	4.48	MD	28	3.48	M	28	2.48	M	28	1.48	M	28	12.48.	M
29	5.48	MD	29	4.48	MD	29	3.48	M	29	2.48	M	29	1.48	M
30	6.47	MD	30	5.41	MD	30	4.47	MD	30	3.47	M	30	2.47	M
31	7.12	MD	31	6.12	MD	31	5.12	MD	31	4.12	MD	31	3.12	M
32	7.24	MD	32	6.24	MD	32	5.24	MD	32	4.24	MD	22	3.24	M

Auguſt frō the firſt to the. 15.			Auguſt frō the 15. to the laſt.			Septēb. frō the firſt to the. 15.			Septē. frō the 15. to the laſt.			Octo. frō the firſt to the. 15	
1	3.20	M	1	2.20	M	1	1.20	M	1	12.20	M	1	11.20	E
2	3.54	M	2	2.54	M	2	1.54	M	2	12.54	M	2	11.54	E
3	4.28	M	3	3.28	M	3	2.28	M	3	1.28	M	3	12.28	M
4	4.45	MD	4	3.45	M	4	2.45	M	4	1.45	M	4	12.45	M
5	6.52	MD	5	5.52	MD	5	4.52	M	5	3.52	M	5	2.52	M
6	7.23	MD	6	6.23	MD	6	5.23	M	6	4.23	M	6	3.23	M
7	7.28	MD	7	6.28	MD	7	5.28	M	7	4.28	M	7	3.28	M
8	7.50	MD	8	6.50	MD	8	5.50	MD	8	4.50	M	8	3.50	M
9	8.12	MD	9	7.12	MD	9	6.12	MD	9	5.12	M	9	4.12	M
10	9.4	MD	10	8.4.	MD	10	7.4	MD	10	6.4	MD	10	5.4	M
11	10.0	MD	11	9.0.	MD	11	8.0	MD	11	7.0	MD	11	6.0	M
12	10.4	MD	12	9.4	MD	12	8.4	MD	12	7.4	MD	12	6.4	M
13	12.12	DA	13	11.12	MD	13	10.12	MD	13	9.12	MD	13	8.12	MD
14	12.13	DA	14	11.13	MD	14	10.13	MD	14	9.13	MD	14	8.13	MD
15	1.0.	DA	15	12.0		15	11.0	MD	15	10.0	MD	15	9.0	MD
16	1.42	DA	16	12.42	DA	16	11.42	MD	16	10.42	MD	16	9.42	MD
17	3.2	DA	17	2.2	DA	17	1.2	DA	17	12.2	DA	17	11.2	MD
18	3.19	DA	18	2.19	DA	18	1.19.	DA	18	12.19	DA	18	11.19	MD
19	3.51	DA	19	2.51	DA	19	1.51	DA	19	12.51	DA	19	11.51	MD
20	3.56	DA	20	2.56	DA	20	1.56	DA	20	12.56	DA	20	11.56	MD
21	5.16	DA	21	4.16	DA	21	3.16	DA	21	2.16	DA	21	1.16	DA
22	5.33	DA	22	4.33	DA	22	3.33	DA	22	2.33	DA	22	1.33	DA
23	6.54	DA	23	5.54	DA	23	4.54	DA	23	3.54	DA	23	2.54	DA
24	7.14	DA	24	6.14	DA	24	5.14	DA	24	4.14	DA	24	3.14	DA
25	7.41	DA	25	6.41	DA	25	5.41	DA	25	4.41	DA	25	3.41.	DA
26	10.19	E	26	9.19	E	26	8.19	E	26	7.19	E	26	6.19	E
27	11.12	E	27	10.12	E	27	9.12	E	27	8.12	E	27	7.12	E
28	11.48	E	28	10.48	E	28	9.48	E	28	8.48	E	28	7.48	E
29	12.48	M	29	11.48	E	29	10.48	E	29	9.48	E	29	8.48	E
30	1.47	M	30	12.47	M	30	11.47	E	30	10.47	E	30	9.47	E
31	2.12	M	31	1.12	M	31	12.12	M	31	11.12	E	31	10.12	E
32	2.24	M	32	1.24	M	32	12.24	M	32	11.24	E	32	10.24	E

Octob. frō the 15. to the laſt.			Nouēb. frō the firſt to the. 15.			Nouēb. frō the 15. to the laſt.			Decēb. frō the firſt to the. 15.			Decēb. frō the 15. to the laſt.		
1	10.20	E	1	9.20	E	1	8.20	E	1	7.20	E	1	6.20	E
2	14.54	E	2	9.54	E	2	8.54	E	2	7.54	E	2	6.54	E
3	11.28	E	3	10.28	E	3	9.28	E	3	8.28	E	3	7.28	E
4	11.45	E	4	10.45	E	4	9.45	E	4	8.45	E	4	7.45	E
5	1.52	M	5	12.52	M	5	11.52	E	5	10.52	E	5	9.52	E
6	2.23	M	6	1.23	M	6	12.23	M	6	11.23	E	6	10.23	E
7	2.28	M	7	1.28	M	7	12.28	M	7	11.28	E	7	10.28	E
8	2.50	M	8	1.50	M	8	12.50	M	8	11.50	E	8	10.50	E
9	3.12	M	9	2.12	M	9	1.12	M	9	12.12	M	9	11.12	E
10	4.4	M	10	3.4	M	10	2.4	M	10	1.4	M	10	12.4	M
11	5.0	M	11	4.0	M	11	3.0	M	11	2.0	M	11	1.0	M
12	5.4	M	12	4.4	M	12	3.4	M	12	2.4	M	12	1.4	M
13	7.12	MD	13	6.12	M	13	5.12	M	13	4.12	M	13	2.12	M
14	7.13	MD	14	6.13	M	14	5.13	M	14	4.13	M	14	2.13	M
15	8.0	MD	15	7.0	M	15	6.0	M	15	4.0	M	15	4.0	M
16	8.42	MD	16	7.42	MD	16	6.42	M	16	5.42	M	16	4.42	M
17	10.2	MD	17	9.2	MD	17	8.2	MD	17	7.2	M	17	6.2	M
18	10.19	MD	18	9.19	MD	18	8.19	MD	18	7.19	M	18	6.19	M
19	10.51	MD	19	9.51	MD	19	8.51	MD	19	7.51	MD	19	6.51	M
20	10.56	MD	20	9.56	MD	20	8.56	MD	20	7.56	MD	20	6.56	M
21	12.16	DA	21	11.16	MD	21	10.16	MD	21	9.16	MD	21	8.16	MD
22	12.33	DA	22	11.33	MD	22	10.33	MD	22	9.33	MD	22	8.33	MD
23	1.54	DA	23	12.54	DA	23	11.54	MD	23	10.54	MD	23	9.54	MD
24	2.14	DA	24	1.14	DA	24	12.14	DA	24	11.14	MD	24	10.14	MD
25	2.41	DA	25	1.41	DA	25	12.41	DA	25	11.41	MD	25	10.41	MD
26	5.19	DA	26	4.19	DA	26	3.19	DA	26	2.19	DA	26	1.19	DA
27	6.12	E	27	5.12	E	27	4.12	E	27	3.12	DA	27	2.12	DA
28	6.48	E	28	5.48	E	28	4.48	E	28	3.48	DA	28	2.48	DA
29	7.48	E	29	6.48	E	29	5.48	E	29	4.48	E	29	3.48	DA
30	8.47	E	30	7.47	E	30	6.47	E	30	5.47	E	30	4.47	E
31	9.12	E	31	8.12	E	31	7.12	E	31	6.12	E	31	5.12	E
32	9.24	E	32	8.24	E	32	7.24	E	32	6.24	E	32	5.24	E

Now

NOw this Table serueth for euery month in ỹ yere (being exactly calculated) the time of their bæing South or touching your Meridian, (or as some terme it Nonestead, seruing very wel the Sea-men to take the height of them with their instruments vpon the Sea, referring it vnto the Table of declination that goeth before: The first is the hours, the second the minutes, the third be the letters that shew you whether they be South by day or by night, in the euening or morning in the forenone or afternone, of which the letter E. doth signifie Euening, the letter M. signifieth Morning, the letters D M. signifieth day in the morning, & the letters D A. signifieth day in the afternone (as I said before) the very houre and minute of their being South. Now you see that I haue put to their bæing South in ỹ day, as wel as in the night, to the intent to know the houre of the night, as well by their setting, as also by your compasse, which I shewed you in the first Chapter or Rule, namely to bring your 32. poynts into 24. houres: And in lyke manner, in the fourth Chapter by shining of the Mone to deuide the shining into equall partes, then those parts bæing equally deuided with the houre and minutes, and the time before their bæing South, put together the halfe that shineth & that sheweth the iust rising of those starres: and the other time of their shining after their bæing South sheweth their setting (as I declared in the rule of the shining of the Mone.) Now you, seeing the Table runneth from the first day of euery month to the 15. from the 15. to the last day, must consider (if you will know the exacte time betwixt the first day or the 15. day, and betwixt the 15. day, and the last) to doe this, loke how many dayes of the month is past, either from the first day or 15. day, and pul foure minutes from that number: For so many dayes as is past, for euery day that shall shew you the true time of

The signification of the letters in the Table.

their

their being South. That knowne, you shall doe (as is afore-said) for their rising and setting.

¶ The .21. Chapter sheweth you the making of a generall Instrument, to know the houre of the day by, throughout al the world.

NOW for the making of your Instruments for the Sea, with their vses, you shall repaire to the booke of Nauigation, made by Martin Curtise a Spaniarde, imprinted by M. Iugge late Printer to the Queenes Maiestie: Else I would haue shewed you the making of diuers Instruments, as also the making of the equinoctiall dial with his vse, which is very profitable to know ẏ houre of the day by, in al latitudes through ẏ whole world, for your Compasse is not to know the houre of ẏ day by in Sũmer, neither in the Morning nor Euening, neither can you know when the Mone is East or West, she hauing North declination, as being in the signe of Taurus, Gemini, Cancer, or Leo: bicause your Compasse standeth flat as doth your Horizon. Wherefore it is verye good for Sea-men to vse ẏ Equinoctial Dials, for that it sheweth them the true houre of ẏ day in al latitudes & also the Mone doth giue a true shadow in ẏ diall in al Latitudes, for I doe know, that Sea-men are very many times deceiued where it doth flow an East & West Mone, or any Poynt betweene the Southeast & Northeast. Bicause in setting the Mone with their Compasse (beeing in the North signes,) shee seemeth to bee East by the Compasse, whẽ shee is neere ẏ East Southeast in hir course: And in like manner when the Mone seemeth West by the Compasse, shee shall bee a lyttle more then West Southwest in hir course. Which is a very

The Sun & Moon do giue a full shadow by the Compasse.

The Equinoctial diall giueth a true shadow all the world ouer.

A perillous matter.

very perillous matter vnto them that shoulde put into a tide, harborow, or hauen, where he knoweth ther is water inough for him, if that he doth come at a full sea, and then by the errour of the Mones shaddow of the Compasse he is deceiued: and when he findeth the error, he thinketh that the cause thereoff commeth by the occasion of some storme of winde that is like to follow, imputing vnto it, that the tide doth not kepe his course, whereas the very cause groweth by no other meanes, but of receiuing a false shadow, by the Horizontal Compasse: and especially if the Mone be nere hir greatest declination vnto the North parts, ỳ is in the Signe of Gemini and Cancer. And also that effect is most preferred, if the Dragons heade be in the beginning of the signe of Aries: for that then, if the Mone be in the beginning of Cancer, she shall haue .5. degrees more in declination from the Equinoctiall, then the Sunne shall haue at their greatest declination vnto the North parts. So that reseruing the Mones paraler, which is according vnto the latitude of any place that the Mone shal be declined .28. degrees and a halfe vnto the North part of the Equinoctial: so that for auoyding of these infirmitis, I would wish them to vse the Equinoctial dials. And furthermore, I doe thinke that the Equinoctiall dials be not vsed amongst our Mariners here in England, for that the charges is so much in the making of them, & yet it serueth no other turne but to knowe the houre of the day, & to shew the true shadow of ỳ Mone. I haue not knowne them vsed by any English Master or Pylot, but onely by one man, which person had not it for the proper vse theroff, but rather had it to say that he had such an instrument as no English man had the like, & to bragge that he had such an instrument, that he could do great feates therewith in going of long voyages, &c. I would haue no man offended with me. I

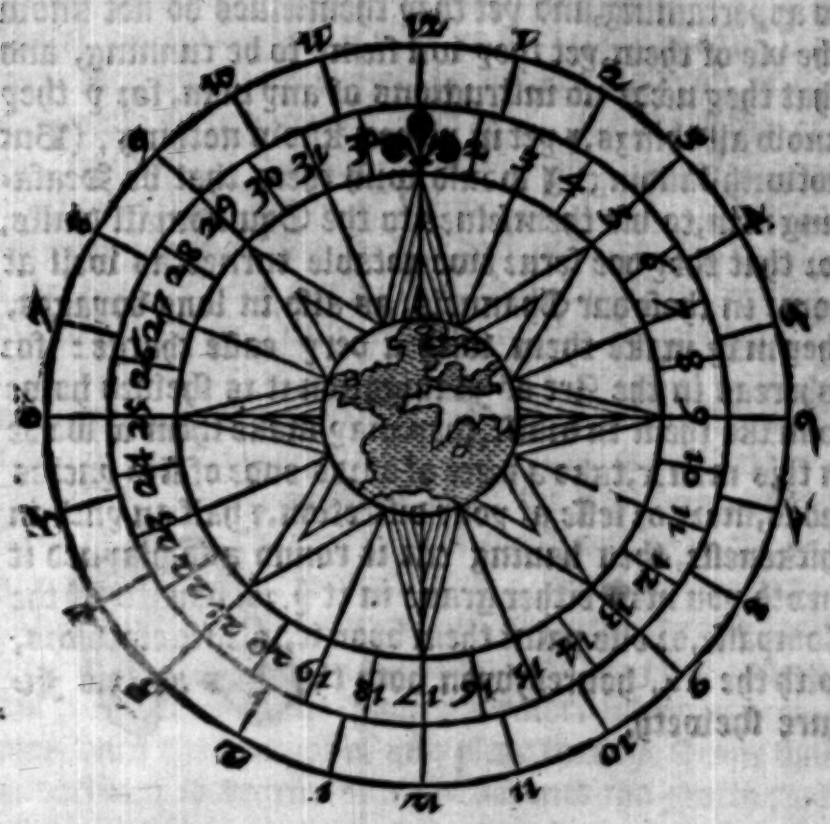
The Moone may decline .28. degrees & a halfe from the Equinoctiall.

know

know the nature & qualitie of some that take charge, they will haue instruments, and other things thervnto appertaining, and yet they themselues do not know the vse of them, yet they wil seeme to be cunning, and that they neede no instructions of any man, for ẏ they know all things, & yet in respect know nothing. (But notwithstanding) I would wish them that be Seafaring men, to vse themselues to the Equinoctiall dialls, for that they doe serue two notable turnes, as well at home in these our Channels, as also in long voyages, they may make them with a very easie charge: for whereas in the Art of Nauigation it is shewed howe to make them in brasse, they may make them wͤ woode in this mãner, take a peece of bords ende of sixe ynches broad, more or lesse at your discretion, & half an ynch in thickenesse, then hauing cut it round and playned it smooth, you may either graue in it ẏ.32. poynts of the Compasse, or else paint them vpon it, with some colors, with the .24. houres, vpon both the sides as this Figure sheweth.

Of men that vvill haue Instruments and know not ẏ vse of them.

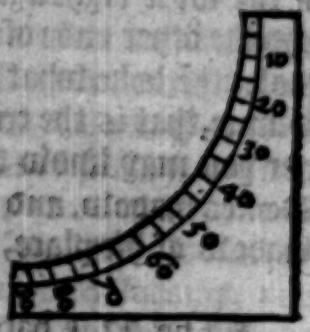
An easie vvaye to make an Equinoctiall diall with little charge.



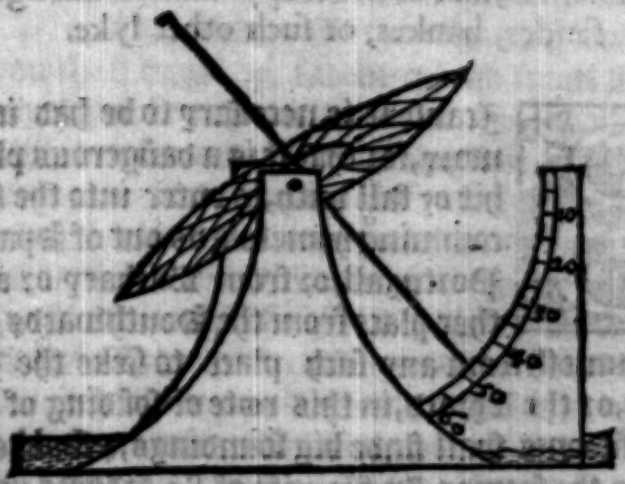
That done, take a Wyre of iuſt the Diameter of the Inſtrument, then put it through the middle or center of the Inſtrument, then make it faſt, that the one ende be halfe way thorow on the one ſide, and the other halfe on the other ſide, this done, make a frame with three peeces of bordes endes to hang the Dial or Inſtrument vpon, with one pinne on the Eaſt poynt and an other on the Weſt Poynt: Then take an other peece of bordes ende beeing ſquare, and with a paire of compaſſes ſtrike a quarter of a Circle, of iuſt the bigneſſe of the quarter of the Diall, and cut al that away, and then the reſt of the Square that is lefte (at the edge of the quarter of the Circle) deuide into. 90. equal parts,

marking

marking it thus .10. 20. 30. 40. 50. 60. 70. 80. 90. As in this forme: last of all, let this be placed in the middle of the frame, so that .90. may stand right vnder the very middle of the viall, and ther made fast, in such forme that the very ende of the Wyre when the Dyall is put vp and down may touch the hollow part that you see cut away, which is called the Directer; and so it is finished, and will stand altogether in this forme.



The Equinoctiall Dyall.



The vse of this Diall is most necessary in a Shippe, for that you haue occasions to trãsport your selues into all the Climates. And to know the true houre of the day, doe this: Set this Diall by your Compasse (the Directer vnto the Southwardes) then (you knowing how high the Pole is aboue the Horizon) set the ende

of the wyre right against that degree, in the Diretor, and the other ende of the wyre wil point iust vnto the Pole, thē loke what shadow the wyre doth giue by the Sunne, that is the true houre of the day. In lyke māner you may know the true houre of the night by the Mones shadow, and also the Mone will giue a true shadow of hir place, &c.

¶ The .22. Chapter treateth of the soundings, comming from any place out of the Occident Sea, to seeke Vshant or the Lyzard, and so all alongst, till you come to the coaste of Flaunders: with other necessary matters to be knowne to them that bee channellers, that doth occupy or deale amongst sandes, bankes, or such other lyke.

BEcause it is necessary to be had in memory, for that it is a dangerous place to hit or fall with, to enter into the sleeue, comming homewards out of Spaine or Portugall, or from Barbary or any other place from the Southwards, a ship that commeth from any such place to seeke the Ile of Vlhant, or the Lyzard, in this route of sounding of a 100 or .90. fadoms shall finde big soundings, & shal be neere about to the seames. In the route of .80. fadoms you shal finde cockle shels & dents in the tallow of the leade: & in this sounding hold on your course to the North, till you chaunge sounding, then if you be at 60. or 64. fadome, you shall finde smal sand & Mathey ground, and shall be neere the coast of Vlhant. If you haue time and day, goe seeke it in the Northeast, and you shal be about

The sounding neere vnto Vshant and the Lizarde.

10.

10. leagues from the Ile. If you come making your course about Base freede, you shall finde course sande, red and browne, and you shall haue sounding at .40. fadome: if you be towards ẏ banke of Silley you shal haue soũdings at 86. or 90. fadom, & you shal find in the tallow stonie ground and shall be well shot towardes the banke of Silley. When you be at 80. fadome, you shall finde smal blacke sande, and shal be well towards the Lyzarde. When you be at 60. or 64. fadome, you shal finde white sande, and white soft wormes, and shal be very nigh to the Lyzard. Betweẽ the cape of Cornewall and Vshant amid the Channell you shal finde 70 fadome, and neere inough. Betweene Dodmon and the Forne, in the Channel you shal haue 40. or 50. fadom. If you be thwart of Plimmouth or the Start, you shal finde streamie ground and dents in the tallow & soundings, 41. or 42. fadomes. At the comming from Portland you shall haue .35. fadomes, and small shingles. And when you be nigh to Portland .30. fadomes, and stones like beanes, and this sounding wil last til S. Aldam, and in the sayd soundinges you shall finde white stones lyke broken Aules, & other that be bigger, & thẽ you shal be thwart of S. Aldam or of the Ile of Wight, Two or 3. leagues frõ the Ile of Wight, you shal finde 25. fadome, with dents & clefts in the tallow like smal thrids. 2. or three leagues from the Caskets, you shall finde. 40. fadom, & big stones ragged & black. Betweẽ the Ile of Wight & the Hag, the deepest is but 35. or. 40. fadom. Betweẽ ẏ Ile of Wight & Lantargat, the deepest is but 25. or. 30. fadom. Betweẽ Beachy & the Ile of Wight a league from the land, you shall finde. 38. fadome, and Poppell as bigge as Beanes. Betweene Fairely and the Water of Summe in the deepest, but 25. fadome. Betweene Folstone and Boilayne, is a banke that is called Rippe rappe: & lyeth in the midde way

The soũding in the channell.

way betwéene Pickardie and England, and hard aboꝛd by it, is. 26. oꝛ. 27. fadome. In the ſtraight of Calice is 30 fadome, in the roade of Calice is. 16. fadome. And alongſt the coaſt of Flaunders is but. 20. fadome the deepeſt. Thus much haue I ſaid foꝛ ẏ entraunce of the Sleéue, to come to the riuer of Thames, and in the entraunce in the midway betwéene Vlhant and Lizard, the Pole Articke is eleuated. 50. degrées & a halfe, and the Equinoctiall is lifted aboue the Hoꝛizon, 39. degrées and a halfe. And furthermoꝛe foꝛ them that are Channellers and occupiers amongſt ſandes and bankes and ſuch other like, they muſt haue conſideration of theſe things following. As this: (firſt if you knoẅ hoẅ the Channell doth lye right betwéene any .2. Sandes) you muſt vieẅ the lande to take ſome markes of it, in this manner to be a leading marke. And that you ſhall doe thus: loke ſome-thing that ſtãdeth farre into the land, that you may knoẅ it well, béeing right open with the channell of the ſandes, then take an other marke, néere vnto the waters ſide, and the one to bée right againſt the other, when that you be in the middle of the Chãnell: And then you knoẅing theſe tẅo markes well, they will be leding markes vnto you foꝛ euer to kéepe that Channell. And then furthermoꝛe, if it doth ſo happen that the Chãnel doth turne to kéepe another courſe, oꝛ elſe (ſome other daunger lying in the way) you muſt haue a thẅart mark, to knoẅ both whẽ ẏ you are cléere of any daunger, & alſo when that you are open of an other Channell, & that you ſhall do as beforꝛe is declared, to take ſome marke within the lãd, & alſo another néere vnto ẏ ſea, water, oꝛ riuers ſide to be your thẅart marke when you bring them both together. And this is moſt ſpecially to be noted: that theſe markes be very yare, & good when the one is farre diſtant from the other: & thoſe markes very ſloẅ & aſketh ſome diſtance

The height of the Pole at the entraũce of the ſleeue

Neceſſary things to be noted for them that are Channellers and dealers amongſt ſandes.

in

in sayling to open and shut them which are neere together vpon the land. And furthermore, for them that are Channellers or occupiers amongst sandes, for that the weather is not alwayes cleere, when they haue occasion to passe through such places, it is good for them to sound the channels perfectly & to know by the depth, what side of the channell they are vpon, and also how farre they are shot into that channell. And also in lyke manner to know by the sounding of any of the sides of the channell, whether they be neere any of the sandes or daũgers, or any breach off: for that some sandes or daũgers there be hauing faire or good soundings or shaldings, that they may borrow off and on, at their pleasure. There bee againe some sandes or daungers that there is no borrowing nor sounding of them, and those be neall or deepe hard vnto the sandes or daungers: for that the water is deepe harde vnto the sande: and these are very daungerous sandes for any ship to come neere, for that they shall haue the water very deepe, & by & by be a ground. Yet furthermore, it is very good for them that be chãnellers & occupiers amõgst sandes, to know which way ỹ tide doth set at euery time of the tide: for that many times it happeneth so that when the sandes be vnder the water the tide doth set crosse the channell, which is a daũgerous matter if it bee not verye well considered by the Maister or Pilote, &c.

¶ The .23. Chapter is as touching the variation of the Compasse, called the Northeasting and the Northwesting of the Compasse: and how to giue a gesse to know the Longitude.

AS touching the variation of the Compasse called the Northeasting or Northwesting, it is supposed that the Compasse doth varie by proportion, in the sayling to the Eastwardes or Westwardes: if it varieth by proportion that the North poynt is varied one point from the North at .22. degrees and a halfe, and so vntill the North Poynt doth stande Northeast or Northwest. And that is, when you are 90. degrees from the Meridian that the compasse was made at, to the Eastwards or Westwards. Some also are of an other opinion, that the Compasse doth varie by no proportion, but doth varie according vnto the nature of some kinde of Mineralls, that is, in some countrey or some kinde of Ilands, that draw the Compasse by the Mines of the Loadestone or Magnes stone that they touch their Compasse with, when they make them. And furthermore, the Booke of Martin Curtise (called the Art of Nauigation saith) ẏ the Compasse doth vary by proportiõ in this mãner: which is, by the proportiõ of a Circle: for ẏ the North Point doth alwayes point vnto a place in the heauẽs ẏ is vnmoueable, & therfore as you do transport your selfe to the Eastward or westward, the North Point doth still poynt vnto ẏ place in the heauẽ: wherfore (as he saith) whẽ you be .90. degrees in longitude frõ the place ẏ the compasse doth stand due South & North, ẏ is, when you be one quarter of ẏ circũference of the earth, in ẏ paralel the Compasse wil be varied .4. points from the North: & as you do trãsport your selfe further, thẽ the North point of the compasse will come nearer & nearer vnto the North: & when you

Of the compasse to varie to euen proportion.

Of the compasse to varie by no proportion.

Of the compasse to varie according vnto the proportiõ of a circle that is, swiftly & slowly.

are

are iuſt halfe the circumference of the earth, ẏ then the Noꝛth point wil ſtand due Noꝛth vpon the pole again: foꝛ ẏ you are come to ẏ ſame Meridian again vpõ ẏ oppoſite part of the earth (as it doth appeare in the .3. part .5. chap. of the ſaid booke of Martin Curtiſe) but if ẏ be true, then the cõpaſſe doth vary ſwiftly at ẏ firſt & ſlowly afterwards, in oꝛder like vnto the Suns declinatiõ: by which (if it be true) they may very wel know what oꝛder the cõpaſſe doth vary by, & ſo by the variatiõ you may giue a neere eſtimation of ẏ longitude, & know in how many degrees ẏ cõpaſſe is varied. 1. point. 2. points, 3. points, & ſo the greateſt variation, which is .4. points. Now to know ẏ propoꝛtion do this: Firſt make a circle wõ a paire of cõpaſſes, & ſtrike a line by ẏ center to the circũference, which ſhal be your Meridian line, thẽ ſtrike another line by the center a croſſe ẏ you may deuide ẏ circle into .4. equal parts, & thẽ foꝛ ẏ .45. degrees is the greateſt variation) ſet .45. vnto the Eaſt part and weſt part, deuiding euery one of the quarters of ẏ circle into .45. equall parts, accoꝛding to the greateſt variation: then make another circle of that Diameter, that the circũference touch that center of the circle: & deuide it as you deuide the compaſſe, after the rate of .32. points, although you neede not deuide but that ſide to the Noꝛwards, & then the Noꝛtheaſt & Noꝛweſt point will fall vpon .45. degrees: that done, dꝛaw lines accoꝛding to the points of the Compaſſe vnto the Eaſtwards oꝛ Weſtwards, & loke how they fall vpon the lyne that commeth from the center of the other Circle: of which euery quarter is deuided into .45. equal parts, & then (at the verie place ẏ the lyne doth touch) dꝛaw paralell lynes in ẏ Circle by pꝛopoꝛtiõ at ẏ very place to the Eaſtwards oꝛ Weſtwards, ẏ the lyne of ẏ compaſſe falleth vpõ: & that wil ſhew you iuſtly how many degrees you ſhal tranſpoꝛt your ſelfe vnto ẏ Eaſtwards

To know in how many degrees going vnto the Eaſtvvarde or weſtward that the compaſſe doth vary 1. Poynt. 2. Pointes or three Points, &c.

¶ The .23. Chapter is as touching the variation of the Compasse, called the Northeasting and the Northwesting of the Compasse: and how to giue a gesse to know the Longitude.

AS touching the variation of the Compasse called the Northeasting or Northwesting, it is supposed that the Compasse doth varie by proportion, in the sayling to the Eastwardes or Westwardes: if it varieth by proportion that the North poynt is varied one point from the North at .22. degrées and a halfe, and so vntill the North Poynt doth stande Northeast or Northwest. And that is, when you are 90. degrées from the Meridian that the compasse was made at, to the Eastwards or Westwards. Some also are of an other opinion, that the Compasse doth varie by no proportion, but doth varie according vnto the nature of some kinde of Mineralls, that is, in some countrey or some kinde of Ilands, that draw the Compasse by the Mines of the Loadestone or Magnes stone that they touch their Compasse with, when they make them. And furthermore, the Booke of Martin Curtise (called the Art of Nauigation saith) ỳ the Compasse doth vary by proportiõ in this mãner: which is, by the proportiõ of a Circle: for ỳ the North Point doth alwayes point vnto a place in the heauẽs ỳ is vnmoueable, & therfore as you do transport your selfe to the Eastward or westward, the North Point doth still poynt vnto ỳ place in the heauẽ: wherfore (as he saith) whẽ you be .90. degrées in longitude frõ the place ỳ the compasse doth stand due South & North, ỳ is, when you be one quarter of ỳ circũference of the earth, in ỳ paralel the Compasse wil be varied .4. points from the North: & as you do trãsport your selfe further, thẽ the North point of the compasse will come nẽrer & nẽrer vnto the North: & when you

Of the compasse to varie to euen proportion.

Of the compasse to varie by no proportion.

Of the compasse to varie according vnto the proportiõ of a circle that is, swiftly & slowly.

are

are iuſt halfe the circumference of the earth, ẏ then the Noꝛth point wil ſtand due Noꝛth vpon the pole again: foꝛ ẏ you are come to ẏ ſame Meridian again vpō ẏ oppoſite part of the earth (as it doth appeare in the .3. part & .5. chap. of the ſaid booke of Martin Curtiſe) but if ẏ be true, then the cōpaſſe doth vary ſwiftly at ẏ firſt & ſlowly afterwards, in oꝛder like vnto the Suns declinatiō: by which (if it be true) they may very wel know what oꝛder the cōpaſſe doth vary by, & ſo by the variatiō you may giue a neere eſtimation of ẏ longitude, & know in how many degrees ẏ cōpaſſe is varied. 1. point. 2. points, 3. points, & ſo the greateſt variation, which is .4. points. Now to know ẏ pꝛopoꝛtion do this: Firſt make a circle wᵭ a paire of cōpaſſes, & ſtrike a line by ẏ center to the circūference, which ſhal be your Meridian line, thē ſtrike another line by the center a croſſe ẏ you may deuide ẏ circle into .4. equal parts, & thē foꝛ ẏ .45. degrees is the greateſt variation) ſet .45. vnto the Eaſt part and weſt part, deuiding euery one of the quarters of ẏ circle into .45. equall parts, accoꝛding to the greateſt variation: then make another circle of that Diameter, that the circūference touch that center of the circle: & deuide it as you deuide the compaſſe, after the rate of .32. points, although you neede not deuide but that ſide to the Noꝛwards, & then the Noꝛtheaſt & Noꝛweſt point will fall vpon .45. degrees: that done, dꝛaw lines accoꝛding to the points of the Compaſſe vnto the Eaſtwards oꝛ Weſtwards, & loke how they fall vpon the lyne that commeth from the center of the other Circle: of which euery quarter is deuided into .45. equal parts, & then (at the verie place ẏ the lyne doth touch) dꝛaw paralell lynes in ẏ Circle by pꝛopoꝛtiō at ẏ very place to the Eaſtwards oꝛ Weſtwards, ẏ the lyne of ẏ compaſſe falleth vpō: & that wil ſhew you iuſtly how many degrees you ſhal tranſpoꝛt your ſelfe vnto ẏ Eaſtwards

To know in how many degrees going vnto the Eaſtvvarde or weſtward that the compaſſe doth vary 1. Poynt. 2. Pointes or three Points, &c.

or Westwards for the varying of the first point, second poynt, and third poynt: and in lyke manner the greatest variation which is the fourth point. So that (according to that order) it will fall out in this manner, that the Compasse will be varied one poynt at nére eleuen and $\frac{1}{3}$. It will be varied two poynts nére about foure and twentie degrées and a halfe.

To knovv how many degr. is in the varying of one Poynt.

It will be varied thrée poynts at fortie two degrées and about a halfe. But it will not be varied the fourth poynt vntil you be foure-score and tenne degrées from the Meridian that the Compasse was made at: which is a very slow varying béeing 47. degrées and $\frac{1}{2}$. before the Compasse doth vary one Poynt, and betwéene the third Poynt and the second poynt being 18. degrées for the varying of that Poynt, and then from the seconde poynt vnto the first poynt is 13. degrées and better, and last of all from the varying of one Poynt to the Meridian it is 11. degrées and $\frac{1}{3}$. part, euery degrée béeing according to the Paralel you are in, which doth alter according vnto your latitude from the Equinoctiall: for vnder the Equinoctiall it is 60. English miles. or 20. English leagues vnto one degrée. In the latitude of 60. degrées from the Equinoctiall, there in that Paralell it is but 30. miles or 10. English leagues vnto one degrée, &c. As it is plainly shewed in the 16. Chapter of this booke, wherein is an instrument shewing you how many miles of longitude will aunswere vnto a degrée in euery seuerall Latitude by the replying of a thrède at your discretion: So that I conclude, if the Compasse doth varye, by that order of proportion that Martine Curtise dothe attribute vnto it, you maye giue a nére gesse to finde the Longitude by the varying of the Compasse being nére vnto the Meridian

If you vvil know how many leagu. a degr. is, repayre to the 16. Chapter.

that

that the compasse doth stand due South and North. But if you be very farre from the Meridian ỳ the compasse was made for, then the variation is so slow, that you can haue no iudgement at all (by the variation of the compasse) to finde any Longitude.

And furthermore if the compasse doeth vary by that proportion that Martin Curtise doth affirme, I am of that opinion, that there may grow some errour in proportion in those compasses that are made for any Meridian: for those Compasses that are made here with vs in England, whereoff the nædle doth stande. 4. or. 5. degrées vnto the Eastwardes of the North (as doeth appeare by all the nædles made for Dials, and also in the compasses) if they would haue the North point to stand due North, then the ende of the wyers vnder the carde of the compasse should stand foure or fiue degrées vnto the Eastwards of the Flouredeluce: wherefore it may be doubted, that the Compasse may vary more the one way than it will the other way, by that proportion that the ende of the wyre doth stande beside from the North point. For (if in the greatest variation) the ende of the wyre (vnder the carde of ỳ compasse) doth stand North-west, the Flouredeluce of the Compasse should stande neare halfe a point to the Westwardes of the North-west. And in like manner at the greatest variation, if the ende of the wyre doeth stande Northeast, then the Flouredeluce should stand neare halfe a point vnto the Northwards of the Northeast. &c. Wherefore the Compasses ỳ is deuised by Norman, is very good to reforme those causes. But this cause is very speciall, to giue a neare gesse of the longitude, that is to say, the compasse will vary more quickly (according to the order before written) by which you see they may transport themselues further vnto the Eastwards or Westwards, before that the compasse doth vary one point, than it doth

There may grow some errour in the proportion of the varying of ỳ Compasse

Of slowe varying of the compasse.

for the other three poynts, so that they are not able to giue any estimation at all, by the varying of the compasse, to know any longitude: for that they may trauel more then the quarter of the circumferenee of ỹ earth, before the Compasse will be varied one Poynt backewards and forwards.

Of making notes of the variation.

And futhermore, it is very good for them that are Masters or Pilotes of shippes, to note, when they doe fall with any land where the Compasse is varied, to make a remembraunce in a booke, how many Poynts and degrees the compasse is varied in euery place wher they come vnto, which wil be a great helpe for thẽ, to finde that place againe. And to finde the variation, it is declared in the firt Chapter.

¶ A Hydrographicall discourse to shew the passage vnto Cattay, 5. manner of wayes, two of them known, and the other three supposed, where-in you shall know the distaunce vnto Cattay and also by what Points or windes of the compasse that you shal saile for the attayning thether and also the rest of the East Indies.

WHereas it hath bene oftentimes in question of late yeres now in this our age, for the discouerie for to finde out a waye to come vnto Cattay, China, and the Ilands of Moluccas: & other places in the East Indies. I haue thought it good to write this Hydrographicall discourse, to goe vnto Cattay. 5. mãner of wayes, for ỹ there is some people, ỹ are doubtfull whether that there is any such place, other some

some is doubtfull that there is no Passage thether.

So some holding one opinion and some another, I haue taken vpon me for to shew vnto thē the Passage to go vnto Cattay. 5. manner of wayes, whereof two of them are knowne, and the other three supposed.

Wherein I haue set downe perticularly the courses, that is to say, by what point of the Compasse that you must sayle, and also the distaunce what number of leagues that it is from place to place, I hauing perused the best Cosmographers, and for that we haue no Chartes or Plattes Hydrographicall that doth shewe the true courses and distaunce, it is possible that is not exactly true, but onely to glaunce somewhat neere the matter: Therefore you must not loke to haue it so certeine that there is no errour in it, neyther I am assured that it is not altogether vntrue, neyther in the distaunce nor courses, but that you maye haue some ayde by this, &c.

And first this, for to goe vnto Cattay that way that the Portugalls doth goe vnto Calicut and the Ilandes of Moluccas, which is about by Cape bone sperance, and now for to procēde to goe that way, and first this for to depart from the Lizarde or Cape of Cornewall beeing the Westerne part of Englande, and for to make your direction from thence vnto the Canarie Ilandes hauing latitude twentie eight and a halfe, the course is neere the South Southwest about fiue hundred leagues.

And of the Starbord side is the West Occean sea, and on the Larbord side, first the coast of Fraunce, and then the Coast of Spayne and Portugall, and then the Coast of Barbarie in Africa, &c.

And from the Canarie Ilandes vnto Cape de varde in Ginney, the Latittude thereoff is neere. 15. Degrees,

and

and the course is South about.270.leagues,and on the starboorde side is the West Occeant Sea, & on the larboord side the coast of Barbarie,and Ginnie, and from Cape de Varde,vnto Cape Palmas,the latitude is nere 4.degrees,and the course is South and by East, about 230. leagues, and on the starboorde side is the Occeant Sea, & the larboord side, the coast of Ginnie. And from thence for to make your direction with Cape bone Sperance, being the Southermost part of all Ethiopia, forsaking the coast, and to make your course thorow the Sea, the course is neare the Southeast and by South, 1060.leagues,and the Altitude is the Antartike Pole about. 35. degrees aboue the Horizon, and on the starboord side is Brasile in America, and the great River of Platte,and on the larboorde side is the coast of Castel de Mine in Ginnie and Binney, & the coast of Ethiopia,&c. But if that you will keepe the coast of Ginnie, then for to depart from Cape Palmas,for to goe vnto the Ilande of Saint Thomas,thē your course is East & by South, neare.560. leagues, and the Iland of Saint Thomas hath no Latitude,for that it is directly vnder the Equinoctial,and on the starboord side is ẏ Occeant Sea, & on the larboorde side the coast of Castel de Mine, and the coast of Binney &c.And from the Iland of Saint Thomas vnto Cape bone Sperance,the course is South and by East,about.750.leagues,and on the starboord side is the Occeant Sea,and on the larboorde side the coast of Ethiopia: & now frō Cape bone Sperance,vnto ẏ great Ilande of Saint Laurance,the Westermost part of the Iland,and that hath Latitude toward the Antartike Pole,about.28. degrees, and the course is from Cape Bone sperance, Northeast and by East, about.550.leagues,& on the starboord side,is the vnknowen land that lyeth towards the Antartike Pole, & the larboorde side the coast of Ethiopia,and the length of the Iland is a-

bout

bout 360. or 400. leagues, and the longest way of the Iland doth lye East Northeast and West Southwest, and is from the mayne land of Aethiopia about. 80. or 100. leagues, &c. And furthermore by the way, I doe thinke it good for to shew the course and distaunce vnto the red Sea, & also the course and distaũce, vnto Calicut. And first this, for to set out your course for to go frō the Easternmost ende of the great Iland of Saint Laurence, and that hath the Antarticke Pole rayled 13. degrees. And for to go with the straights of the Redde Sea, the course is North and by East about. 470. leagues, and the latitude of the streights, is about. 10. degrees, towards the North Pole, and this streights, is greatlye occupied, for that all the Spices ỹ serueth the Turkes dominions and also some partes of Christendome, is brought from the Ilandes of Moluccas and other parts in the East Indies as Calicut and such lyke places, & so by shipping transported into the Redde Sea, and so put on lande in Aegypt, and then caryed ouer a lyttle part of the lande, & then is newly embarked, & brought down the great riuer of Nilus and put a land at Alexandria in Aegypt, that is a Port in the middle earth Sea, and from thence it is transported by shipping vnto a number of places both in the Turkes dominions and other places christened, &c.

And from the straights vnto the hether ende of the Redde Sea in Aegypt, the course is for the most part Northwest and More Northwest, about nere. 500. leagues. And going into the Redde Sea, ỹ Starbord side is the coast of Arabia, and the Larbord side is first the coast of Aethiopia and Aegypt, &c.

And also if that you will goe from the East ende of the great Ilande of Saint Laurence vnto the famous Marchaunt towne called Callicut in India, then your course is Northeast and to the Eastwards about. 860.

leagues, and the latitude is .5. degrées to the North parts, and on the Starboord side is the Occean Sea, and the Larboord side is first the coast of Aethiopia, & the straights of the redde Sea, and the coast of Arabia and the straights of the Persians Sea, and the Ilandes of Ormes, &c.

But if that you will hold on your course to goe vnto Cattay, then from the East ende of the great Iland of Saint Laurence, for to goe with the great Iland called Traprobane, your course is East Northeast, or East & by North about. 1100. leagues, but it is possible, that in these courses, you may mæte with a number of Ilands, for that all this East Occean Sea is very ful of great and small Ilandes, and the middle of this great Ilande lyeth directly vnder the Equinoctiall, and the length of this Ilande is nære. 300. leagues, and on the Starboord side is the vnknown lands, towards the antarticke Pole, and on the Larboord side the straightes of the redde Sea, Arabia, the Ilandes of Ormes, the Persian Sea, Calicut, and the great riuer of Ganges.

And now for to depart frõ the great Iland of Traprobane, to go vnto the great Iland of Gelilow, beeing the greatest Iland amongst all the Moluccas, the course is East about .1000. leagues but ther lyeth a number of Ilands in the way, and on the Starboord side, is the Ilande of Iaue and Berno, and on the Larboord side, the greatest heap of ẏ Moluccas Ilands. The Iland of Gelilow hath no latitude, for that it lyeth directly vnder ẏ Equinoctial, and for to goe from the Iland of Gelilow to goe vnto the coast of China, the course is North & by West, about. 500. leagues. The latitude of China, is about. 25. degrées, & on the Starboord side is ẏ South sea, & America, & the larboord side, is ẏ Ilands of Moluccas: but for to goe from the great Iland of Traprobane, the next way to China, the course is Northeast & by East

1000. leauges, & then on the Starbord side, you shall haue al ẏ Molucças Ilands, & the larbord side ẏ maine lande of Asia or East India, and then from the coast of China vnto the great Baye of Quinsay in Cattay, the course is North and by East about 1100. leagues, and the entraunce of the Baye of Quinsay, the latitude is 35. degrees, & on the Starbord side is the firme land of America, & the great Ilande of Iupan, & the Larbord side the coast of China and Cattay, &c.

Now thus much haue I sayd as touching the way to come out of England to goe vnto Cattay, and East India, hoping that the reasonable Reader will not enuie me for this vsing my discourse, neither you must not looke so exquisitely vnto it, for that it cannot be the exact truth: for as I do suppose ẏ no English man hath seene any true Charte or Platte of all the East India, wherefore I doe suppose that you will beare with this my discourse, &c.

And now furthermore as touching this discourse for to come out of England to goe vnto Cattay, the seconde way, and that is known that the Sea wil let thẽ haue passage, that is to say, thorow the straights of Magalenos, & so into the South Sea, as this, first to make their direction frõ the west part of England vnto ẏ straights of Magalenos, although that in deed ther can be no long passage by Sea, but ẏ the ships are to seeke some places for to water at, & other easemẽts, yet notwithstandinge I do meane to make but one directiõ or course frõ Englãd vnto ẏ straights of Magalenos, for ẏ the masters or ẏ pilots may seeke their watring places most best for their purposes, &c. And first, frõ ẏ Lizard vnto ẏ straights of Magalenos, ẏ course is for the most part South southwest & to ẏ westwards, about 2400. leagues, & the latitude of ẏ straits is 52. degrees, & a half towards ẏ antartick pole, & on ẏ starbord is ẏ firme land of America,

and the Larbord side Europe and Africa,&c.

And thorow the straights the course may be West, or West Southwest 100. or 140. leagues before that they be clerely in the South Sea, and now being into that Sea, they may goe either vnto Cattay, or the Moluccas, or the Port of Pannama, ỹ is the place, that the King of Spayne hath all the treasure that commeth from Perro. And from thence it is caryed vp a certain riuer, and then transported ouer the necke of a lande, and then embarked and brought down an other riuer, and so landed at Nomber the Deas, & from thence trãsported by shippes into Spayne,&c.

And now they being through the straights of Magalenos if that you wil go vnto the porte of Pannama, then their course is for to goe Nornorwest or Norwest and by Nore, or Nore and by West as the lande will giue them passage, for that there hath not bene made any true plats for that coaste in that sea, and doth containe in leagues from the straights vnto the Porte of Pannama, 1100. or. 1200. leagues. But if that you will goe from the straights vnto Cattay, as it is a Sea that is not vnto the South parts neere the straights not wel knowne, so there may lye many Ilandes in that Sea that you may meete with, and also there may be Rocks and daungers there in lyke manner ỹ are not known, but the general course is Norwest vnto Cattay or China about. 2800. legues, hauing on the Starbord side the mayne lande of America, and on the Larbord side the vnknown lande that lyeth towards the Antartick Pole, and also the Ilands of Moluccas and Calicut: and thus much haue I said as touching the passage vnto Cattay, by these two wayes that are known. But here is one thing to be noted, for as it hath ben reported, that when that the Portugalls Carrickes doth goe vnto Calicut, that when that they be at Cape bone sperance,

then

then they doe not directly set their course the next way but standeth South ouer towards the lande that lyeth to the Antarticke Pole-wards, and the cause thereoff is by the meanes of the great Current that is at Cape bone sperance, continually running from the East into the west, and then when that they haue gone a .100. or .150. leagues vnto the Southwards of the Cape, thē they set their course for to goe with Calicut, so that outwards that they do not come néere the great Iland of Saint Laurence, but goe a great deale to the Southward of it, for that they will not be let by the great currant: But when that they doe come homewards, then they doe come hard by the Ile of Saint Laurence, and so directly with Cape bone sperance, for that they will haue all the help that they may with the Current, then they goe West Northwest into the Sea with the mayne lande of America, till that they be halfe that Sea ouer, and then they doe set their course to goe homewardes, as it is not vnknowne that when the Spanish Flæte doth go vnto the west Indies, ỹ when they go outwards that they doe goe vnto the Canaries, & so West into the Sea, and so holding in the South lande of the Baye of Mexico, for that they haue some helpe by the current: but when that they doe come home then they doe come by the North lande of the Baye of Mexico, betwéene the Iland of Cuba and Terra Florida for that they wil haue the Current homewards to helpe them: also it is reported that in the straights of Magalenos, that the Current runneth continually from the East into the West. Now this much haue I sayd as touching the two wayes vnto Cattay, for that it is knowne that there is passage by Sea, if that it were attempted, although the passage is very long, &c.

And now furthermore, for to discourse the third way, that is not known, but supposed that it may be passage-

able that is by the Northwest, as now of late Captaine Forbisher hath begun, and hath discouered as farre as a place now called Meta Incognita, which he himselfe did call Forbishers Straights, but yet notwithstanding it is doubtfull whether that it be a straightes to giue passage to come into the East Occean Sea, or South sea, for any thing that is knowne yet, it maye bee as well a Baye as otherwise, but notwithstanding whether that be a straight or not, it is possible that ther may be passage there about, betwene the Norther parte of America, as betwéene Labradorre and Groynland, and such landes as lyeth vnto the North Pole-wardes.

Wherefore now for to depart from England to go vnto Cattay by the Northwest, first this for to make their direction from the West part of England vnto the place called Meta Incognita the course is West Northwest about. 650. leagues, and the latitude thereoff. 63. degrées, and on the Starbord side is first Ireland, and Iselande, and Freeseland, and on the Larbord side, is the Occean Sea. And now being at Meta Incognita, they must discouer there abouts where that they maye finde Sea for to giue them passage, and yet if they doe finde Sea they must holde on their course West vntill that they haue passed .1000. or .1100. leagues. For if that they should holde on any Southerly course, then they should inbay themselues in the mayne lande of America, for the extension of the backe side or North side of America is not much lesse then .1000. leagues, before that they shall open the way into the East Occean sea, & in this west course on ỳ Starbord side is the North Pole and such landes as lyeth that waye if there bee anye, and on the Larbord side, is the mayne of America.

And after ỳ they haue sayled west .1000. leagues on the north part of America, they may thẽ direct a more

Southerly

Southerly course, for that then they may be open of the East Ocean sea, for that the most part of the best Cosmographers laye the openinge of that Sea opposite vnto vs in our Meridian, and then holding on a southerly course, thē they may haue vnto the great bay of Quinsay about .400. or .500. leagues. And the latitude of the north part of the Bay of Quinsay in Cattay is about .46. degrees, and on the Starbord side is the coast of Asia, as Mangie and Cattay, and the Larbord side America. And thus much haue I sayde as touching the third way to goe to Cattay, &c.

And now in lyke manner as touching the .4. way to goe vnto Cattay not knowne but supposed, and that is by the Northeast part or North part of Russey, about by that way that Master Barrowes began the discouery, about by a lande that is called Noua Zembla, which is a countrey or Poynt of a land that ertendeth vnto the Northwards, it is not knowne how farre, and yet it may be possible that it is nauigable that wayes if it were attempted.

And now for to passe that way vnto Cattay I will a lyttle vse my discourse. The way and distaunce vnto the North Cape in Norway is not vnknowne vnto a number of Sea-men the latitude thereoff is .71. degrees .20. minutes, therefore I doe thinke it best to beginne the direction and setting out their course East vntill that they doe come with the land of Noua Zembla, and then fallyng with that place to make their discouerie as the lande will giue them leaue, and so in this direction it maye be possible that they maye finde a Sea to giue them passage as it maye bee possible that when they may meet with land ẏ they shal be constrayned to goe Northeast or North Noreast, vntill that the North Pole be raysed eightie or eightie fiue degrees, yet they maye holde on theire course vntill

such

such time that they shall be incombred with Ice, for it may be so that in the latitude of .80. degrees, ther shall bee no Ice, although that on the coaste of Baculayas, you may haue Ice in the latitude of .50. degrees, for no man can tell vnto such time as it hath bene put in experience, & now in this passage vnto the Eastwards from the North Cape vntill that they shall haue ỳ sea opē to come into the Southwards in the sea of Cattay, it may be about .1000. or.1200.leagues, and then in this passage on the Starbord side is first Norway and Lapia, and the Baye of Saint Nicholas, and the great riuer of Obe and Noua Zembla, and the East parte of Asia, and on the Larbord side the North Pole & those landes that lye ỳ waies if there be any, and now in the following of the coast of the land which may be South-east or South Southeast or South, it may be .500. or 600. leagues vnto the Bay of Quinsay in Cattay & on the Starbord side is Asia & the coast of Mangie & Cattay, & on the Larbord side the mayne land of America, &c.

And furthermore it may be possible for to finde passage for to goe to Cattay betwæne Noua Zembla, and the country of Samwetes, thorow the Sea of Vagates, & this passage may be somewhat shorter, then for to goe vnto the Northwards of Noua Zemla, and then you shal haue in this passage vpon the Starbord side, first the countrey of Samwetes, as Pichora & the riuer of Obe & Tartaria, &c. And on the Larbord side, Noua Zemla, &c.

And this I doe ende as touching the Northeast passage to goe or attaine vnto Cattay the fourth waye, &c.

And furthermore as touching the fifth way to goe vnto Cattay, it is possible that in my discourse it is mære folyshnesse, and a thinge vnpossible for it to bee done, and yet notwithstanding no man can tel, before

that

that it is put in experience, & yet it is the nereſt way if that it be nauigable, and my meaning is this, for to goe directlye vnto the Pole if ſo bee that there is no lande to let the paſſage. Now it is poſſible that ſome will ſay that it is the froſen Zone, but notwithſtanding if that there is not lande that way, then it is not froſen, for the great ſalt Sea neuer freſeth, and for that you doe ſée the great quantitie of Ice on the Coaſte of Labradorre and Baculayas it is a token that ther-abouts is much lande towards the North Pole wards, and ſo is froſen in Sondes and Riuers, and ſo in the breaking vp of the yeare that then it doth come driuing out to Sea: for in reſpect they doe ſeldome ſée any Ice at the North Cape, not. 100. leagues North off from thence, which is a great token ỳ there is no land towards the Pole-wards, and before that it hath ben put in proſe it cannot be knowne. But al the doubts for going vnto the Pole-wards, is for feare of too much colde, and yet notwithſtanding it may be reſonable warme right vnder the Pole for any thing that is knowne vnto the contrarye, by the longe continuaunce of the Sunne in Summer, for that in the time of .9. Weekes that the Sunne is neuer leſſe then .20. degrées aboue the Horizon going round about them, ſo that the continuaunce of the Sunne muſt inforce the ayre to bee reaſonable warme, & eſpecially if ỳ there is no Ice driuing in ỳ ſea, for it is not ſo cold at Meta Incognita, if that they bée not amongſt the Ice, for if that they be at Sea and not amongſt Ice, then it is verye warme, and alſo if that they bee a ſhore then it is warme in lyke manner, ſo that the cold is by no other meanes but the cold breath or ayre that cõmeth from the Ice. And now for to proceede to goe vnto Cattay and to goe directly North till that they be right vnder the Pole, and then to go ſouth to the oppoſite part beyond the pole, which is to be done

if that they be not let by any land that lyeth in ỳ way then it may be possible for it to be done, and then the whole distaunce in this course frō the riuer of Thames vnto the Bay of Quinsay is but .1680. leagues, which is a very short way in respect of the other. But now it is possible that some will make argument and say, that it is not possible for any man to make any direction or set any course beeing directly vnder the Pole for that it is not knowen which way that ỳ compasse will stande, and also in lyke manner beeing vnder the Pole all places is South which way soeuer you goe, & also the Sunne is equally one height, so that you can make no prose which way is forwards, & which waye is backewards, therefore it is to be supposed, that some wil say that is not possible for to make any instrumēts to assigne any course to any place appoynted, for truth it is beeing vnder the Pole that anye place assigned is South from them that is vnder the Pole, what quarter of the world soeuer that it is in, and if that the Sea will giue thē passage their course is South to go vnto it, &c. Yet notwithstanding I wil shew vnto you what you shall doe to make a perfect direction vnto any place appoynted you being righte vnder the Pole, that you shall know whether that you doe goe backewards or forwards or any other way that you shall appoynt, so that you may see the Sunne, and that must be done, as this. First prepare a perfect good clock that goeth with a Spring & to be made in that order that the directer or poynter doth go round in .24. houres, & so to be marked for to ende .24. houres at noone, and then to begin one, and this clocke or diall being well made and doth keepe the time truely, then when that you doe approche neere the Pole within .100. leagues, that is at the latitude of eightie fiue degrees and so farre the Compasse maye serue, and also you may correct the cōpasse wel inough

for

for that the Sunne is .10. degrées higher on the South part then it is on the north part, and now going within .5. degrees of the Pole, set your clock to worke and 24. houres to be noone, and then when that you are directly vnder the Pole, looke if that the Poynter dothe stand vpon .24. hours, then that parte or quarter that the Sun is in, is right backe againe, & if that it poynt 12. houres, then towards the Sunwardes is right forwards, and if that it poynt .6. houres, then towardes the Sunwards doth shewe that if any place bee West from the place that you did come from, and is one quarter of the earth, that direction willl set you right vppon it, and if .18. houres, then towardes the Sunne doth appoynt you that place that is East one quarter of the earth, &c.

And nowe for to set any course to stirre the ship vppon any place appoynted, then note this as for an ensample, I would goe directly homewards, and then I will set the Flye of a Compasse before him that shall stirre and then for that I come out North and I must goe home South and lay the Card or Flye stedy before me, and the South point right with the shippes heade or Stem, and so I doe set the clocke by it, now if that the clocke doth poynt .24. houres for that afore was my noone, then I doe stirre the ship right vpon ẏ Sunne, & if the clocke doth appoynt .3. houres, then he ẏ doth stir must kéepe the Sunne vpon the Southwest, and so shal the shippe goe that South that she came from, and if that the clocke doth poynt .6. houres then he that doth stir must kéepe the Sun vpon ẏ west poynt, and if the clock shew .9. then kéepe the Sunne vpon the Norwest.

If the Clocke doth shewe twelue, then the Sunne must bee on the North Poynt that is right with the Starne of the shippe . And if the clocke dothe shewe fiftéene houres then hee that stirreth muste

kæpe the Sunne vpon the Northeast poynt if .18. then the Sunne on the East Poynt, and if .21. houres then on the Southeast Poynt, &c.

But now if that you would goe directly forwards, then lay the North Point right with the shippes head, and when the clocke doth poynt .12. then stirre right vpon the Sunne, and so in lyke manner to stirre by the Sunne as I haue afore shewed you by ensamples, so that you may sée by this clocke or Diall, you maye assigne your selfe to kæpe any course vnto any place in the whole worlde, you bæing vnder the Pole, and then when that you are departed from the pole .100. leagues that is .5. degrées, then you may vse your Compasse and correct it by the Sunne at your pleasure. And thus much I haue sayd as touching the passages to goe vnto Cattay, wherefore gentle Reader beare with my rudenesse, for that I am so bold to vse my discourse vppon the passage vnto Cattay. And furthermore some men hath bene of that opinion that when that they are in the East Occean sea that they shall mæte with no shipping as about Cattay and China, &c.

But notwithstanding it is a Sea that there is a huge number of shippes both great and small, for this must be most certeine that whereas there is such great trade of Marchaundize, and also such a number of Ilands both great and small, and also such a number of commodities in those Ilandes, so that any man maye iudge that there is great store of shippes, and also ordinaunce in their shipping, &c. And it is not vnknowne but ỹ the great Cane of Cattay is a Prince of great power as well by Sea as by Lande, then iudge you whether that such a Prince of such a force and wealth but that they wil prouide for all things mæte for warres. Therefore as some as they come into those coasts they must orderly vse the trade of Marchaundize, and not to

vse

vse force, &c. As vpon a time I being with Master Dee at his house at Murclacke, we falling in talke about the discouerie to Cattay and so talked as touching ỹ shipping, wherevpon he opened a Booke and shewed me a note what number of ships that the great Cane had redy at one time to go vnto Sea about his affaires, surely you would thinke it incredible, the number was 15000. surely a huge army by Sea: and then I replied agayne that it might bee that they were but small things and yet they might call them ships, and then he turned vnto another place where the great Cane did sende one of his daughters by Sea, and did appoynt 14. of his ships, and the least of the 14. shipes had 250. Mariners beside all the rest of his Daughters trayne, and such Nobles as did accompanye hir, which must be no small number. Therefore it is most manifest that the Cane is a great Prince of power as well by Sea as by Lande.

FINIS.

The Table of the Contents of this Booke.

THe first Chapter of Nauigation, sheweth what the 32. Poynts of the Compasse be, and to what vses they doe serue. fol. 8.

The .2. Chapter treateth of the Golden number or Prime, shewing the Epact, & by the Epact, to know the age of the Moone. fol. 10.

The .3. Chapter teacheth how to know by the age of the Moone what a clocke it doth flowe, or is full sea at any place where you doe know what Moone maketh a full Sea. fol. 11.

The .4. chapter treateth of the Sunne & Moones course in the Zodiacke, and how you shall know at what houres the Moone shall rise and set at: & at what point of the Compasse, with other necessary things. fol. 15.

The .5. Chapter is of a Table of declination commõly called of Seafaring men a Regiment of the Sun, exactly calculated for .4. yeres, and will serue for .24. yeres for euery day of the Moneth. fol. 18.

The .6. Chapter sheweth how to take the height of the Sunne with the Crosse staffe. fol. 29.

The .7. chapter sheweth how to handle the declinatiõ of the Sunne, to know the altitude of the North pole aboue the Horizon (the height of the Sunne being truely taken and knowen in any place between the North Pole and the Equinoctiall) so that the Sunne be vnto the Southwards of you, at the taking of the same vpon the Meridian. fol. 33.

The .8. Chapter sheweth you how to handle the declination of the Sunne, when you are betweene the Equinoctiall and the Sunne, that is to say, the Sun to the Southwards or Northwards of you, and the Equinoctial to the Northwards or Southwardes, or vnder

vnder the Equinoctiall, the height of the Sunne being truely knowen or taken. fol.34.
The.9.chapter ſheweth how to handle the declination of the Sunne, when you are beyond the Equinoctial, that is to ſay, betweene the South Pole & the Equinoctial with certeine enſamples both for the South Pole and the North Pole. fol.36.
The.10.chapter ſheweth how to handle the ſunnes declination vnto the Northward, where the Sun doth not ſet vnder the Horizon: & alſo to take the Sun at the loweſt due North. fol.38.
The .11. chapter doth ſhew how you ſhall know the length of the day, and to know how much the daye is ſhortned or lengthened by the Suns declination. fol.41.
The.12. chapter is of the North ſtarre. fol.43.
The.13. chapter doth ſhew you by the ſayling vpon the quarter of your compaſſe, in how far ſayling you doe rayſe a degree, and what you doe departe from the Meridian, &c. fol.44.
The.14. chapter ſheweth how to know how farre any land is off from you, if you know the diſtaunce betweene any two places whether that you doe runne alongſt by the lande, or directly to the ſhore, or otherwiſe with other neceſſary things. fol.45.
The.15.chapter treateth of the longitude.&c. fol.49.
The.16.chap.ſheweth how many miles will aunſwere to one degree of Longitude in euerye ſeuerall latitude betweene the Equinoctiall and either of the.2. Poles: with the demonſtration for that purpoſe, and alſo the diuerſitie of aſpects of the Moone. fol.50.
The.17.cha.ſheweth the circūferēce of the whole earth & the ſea vnder ſundry Paralells, whereby that any ſea-mā may know what quātitie or part of the earth that he hath ſailed or paſſed by the nūber of leaug. & alſo he may know the alteracion of time, &c. 52.

The

The .18. Chapter ſheweth how to ſaile by the Globe. And to knowe how much the water is higher then the leuell betweene any two ſhips on the ſea which groweth by the roundnes of the earth, fol.53.

The .19. chap.is as touching the making of Plattes or Cards for the ſea,& not to paynt their Cards as they do,but rather to fill the vacant places with other neceſſary matters,& alſo of.3.neceſſary things conteined in the Plats or Cards,with their vſes, fol.55.

The.20.chap.is of the longitude and declination of.32. notable fixed ſtarres for Nauigation, with tables of their ſhining,& at what point of the compaſſe they do both riſe & ſet:it hath alſo tables for euery month in the yeare, declaring at what time they will bee South, &c.which will continue this hundred yeares without much errour. fol.58.

The.21. chap.ſheweth you the making of a general inſtrumēt to know the houre of the day by,throughout all the world, fol.65

The.22.chap.treateth of the ſoundings comming from any place out of the Occidental ſea to ſeeke V ſhant or the Lizard,and ſo al alongſt till you come to the coaſt of Flaunders: with other neceſſary matters to be known of them that be Channellers,that occupy or deale amongſt ſandes, bankes,&c, fol.67.

The.23.chap.is as touching the variation of the cōpaſſe, called the Northeaſting & Northweſting of the cōpas,& how to giue a geſſe to know the lōgitude.69.

A Hidrographicall diſcourſe to ſhew the paſſage vnto Cattay,China and Eaſt India.5.manner of wayes.2. of them knowen and the other.3.ſuppoſed, wherin you ſhall know the diſtaunce vnto Cattay,China,& the Moluccas and Calicut,& alſo by what poynt or winds of the cōpaſſe that you ſhall ſayle for the attayning thether,& alſo the reſt of the Eaſt Indies, 71.

FINIS.

THus endeth the Regimēt for the Sea, now the third time Imprinted, 1580. being exactly ouerseene and augmented by the foresaid Authour, William Bourne: who hath added these consequents. What Excentrik and Paraler is. To know when the Mone is in hir swift & slow motion. To know the Mones latitude. The cause why there is more dayes from the Equinoctiall of March vnto the Equinoctiall of September, then from the Equinoctial of September vnto the Equinoctial of March. Also certeine matters touching discoueries toward the North partes. To know how fast or slow the ship goeth, and to keepe account of hir way. To knowe what quantitie of the earth you haue passed. To know the diuersitie of aspects, as the Eclipses of the Mone, and the alteration of time, likewise a Hidrographicall discourse shewing fiue wayes to go vnto Cattay, two knowen, & three supposed: with diuers other matters for breuitie omitted, very needefull in this last Impression.

Tanner 764

1580.

¶ Imprinted at London by
T. East, for Iohn Wight.